January - March 2021

BULLETIN OF THE

PET PRACTITIONERS ASSOCIATION OF MUMBAI.

(For Circulation amongst PPAM Members)

Contents:

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The Secretary, PPAM.
Shop No. 1, Bramhandev CHS,
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Mumbai 400 016.

Editorial

PPAM members come forward and participate in The Pet Parents Awareness Programme

Pet Practitioners Association of Mumbai in collaboration with the Veterinary Health Department of Municipal Corporation of Greater Mumbai (MCGM) is jointly organizing the Pet Parent Awareness Programme. The managing committee requests you to wholeheartedly participate in this awareness program.

The PPAM managing committee proposes to jointly work along with the Veterinary Department of BMC for increasing awareness among pet parents. The awareness program would include:

1. MCGM dog license and its renewal.
2. Rabies vaccination annually in dogs and its importance.
3. Leptospirosis vaccine annually in dogs and its importance.
4. Appropriate disposal or clean-up of their dogs' litter (poop).

This we plan to be a part of the World Veterinary Day program to be held on Saturday 24th April 2021.

A) This program does not involve any gathering of people. Participating Veterinarians will do this program at their veterinary clinics. Whenever pet parents approach the veterinarian for vaccination or consultation our PPAM veterinarians will hand out the printed leaflets and counsel the pet owner to be aware of rules. (sample copy of leaflet enclosed). This we intend to carry out for one full year 1.4.2021 to 31.03.2022.

B) A small 12" by 18" poster will be displayed in the veterinary clinics to educate the pet parents. (sample poster enclosed)

C) Our veterinary doctors will try to vaccinate as many stray dogs as

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possible from 01.04.2021 to 24.04.2021. The cost of vaccination will be borne by PPAM. (The participant doctors will have to maintain records of stray dogs vaccinated as vaccines will be supplied by PPAM) (A photograph while vaccinating stray dogs would be welcome and mail it to editor PPAM bulletin. vishwasraodr@hotmail.com)

The expectation from Veterinary Department MCGM.

1. The veterinary department BMC shares statistics with PPAM regarding the actual and overall impact of this pet parent awareness program in terms of an increase in the number of dog licenses.
2. The impact of this program on the reduction of rabies and leptospirosis cases in the human population.

Veterinary Health Department of Municipal Corporation of Greater Mumbai (MCGM) in collaboration with Pet Practitioners Association of Mumbai (PPAM)

PET PARENTS AWARENESS PROGRAMME

1. As per sections 191(A) and 191(B) of the Mumbai Municipal Corporation Act 1888 it is mandatory to have a license to keep a dog. MCGM dog license and its renewal are now available online on the MCGM web portal. (For Assistance in obtaining an online dog license please call 022-20853284 extension 318 between 10.30 AM to 5.30 PM from Monday to Saturday. Alternately, you can email on vetsu04.deonar@mcgm.gov.in). A license is issued to a dog only after six months of age of your pet.
2. Rabies vaccine has to be given to puppies at THREE months of age then again, a booster at NINE months of age, and then vaccinate once every year as long as the pet lives. Pet parents your cooperation will help eradicate this disease as rabies is virtually 100% fatal.
3. Leptospirosis vaccine also needs to be given to your pet once a year as long as the pet lives. Pet parents your cooperation will help control Leptospirosis which is a zoonotic disease.
4. Your veterinarian will examine the dogs before vaccination, remember vaccination is done in healthy dogs, deworming your pets before vaccination will help build better immunity for your pets. Regarding other vaccinations such as Canine Distemper Virus, Canine Adenovirus, and Canine Parvovirus your veterinarian's advice should be followed. Please get your pet clinically examined by a veterinarian so that your pet does not suffer from any infectious disease.
5. Flea, ticks, mites, and internal worms are common in dogs. Periodically get a parasite control program done for your pets as per advice from your veterinarian.
6. Kindly ensure your pet dog is not a nuisance to others.
7. Kindly ensure your pet dog is under control and should be on a leash when in a public place or common utility places. The intent is to protect the health and safety of the public and to protect your pet.
8. Pet parents' cooperation is expected in keeping our Mumbai clean. Pet owners must ensure appropriate disposal or clean-up of their dogs' litter (poop). Kindly note this is also required by law (model sanitation bylaws 2006, under section 461ee of Mumbai Municipal Corporation Act).

Let us together work for the harmonious coexistence of man and animals. Let us together build a kind and compassionate Mumbai.

Feline Thyrotoxicosis

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Dr. S. H. Dalvi

ABSTRACT

Thyrotoxicosis is a clinical condition results from the excessive production and secretion of thyroxine and triiodothyronine. Hyperthyroidism in cat is always the result of primary autonomous condition with benign tumour appears to be much more common than carcinomas. Most hyperthyroid cats have a variety of clinical signs that reflect multiple organ dysfunction. Most frequent sign includes polyphagia, weight loss, heat intolerance, apathy, diarrhoea and also associated with enlargement of one or both thyroid lobes. Hyperthyroidism can be diagnosed in most cats based on clinical signs, palpable thyroid nodules, laboratory findings and hormonal assay. Laboratory findings include increased in serum enzymes ALT and AST. Measurement of random basal serum total T_4 concentration has been extremely reliable in identifying the cats with hyperthyroidism. The feline ${}_tT_4$ reference range is 0.8-2.0 µg/dl. Hyperthyroid cat may have serum ${}_tT_4$ value between 2.0-5.0 µg/dl. Serum ${}_tT_4$ concentration is more reliable than basal serum T_3 levels. If the serum hormones fail to confirm thyrotoxicosis radionuclide thyroid scan should be considered. I^{131} and $99MT_c$ (Pertechnate) provide excellent thyroid images. Thiouracil, Propyl thiouracil (PTU) and Methimazole are drugs used for the treatment of thyrotoxicosis. Methimazole is cheap, readily available, relatively safe and considered as a drug of choice for the management of feline thyrotoxicosis. Surgery must be approach as an elective procedure and as a last resort, not one that must be performed hastily.

INTRODUCTION

Thyroid disorders are very common in pet animals like dogs and cats. Among these disorders' hypothyroidism is very common in dogs, while hyperthyroidism is uncommon. In cat hyperthyroidism (thyrotoxicosis) is common and hypothyroidism is very rare condition.

Veterinary clinicians were not aware of feline hyperthyroidism until two clinical reports were published by Peterson *et al.*, (1971) and Holtzworth *et.al.*, (1980). The incidence of thyrotoxicosis is steadily increasing. The status of this condition is due to increased awareness amongst owners and the diagnostic acuity of the veterinarians. There is no systematic survey on the prevalence of thyrotoxicosis in cats has been carried out in India. Hyperthyroidism caused by the autonomous growth of the follicular cells. There are two types of hyperthyroidism: Exophthalmic goiter (Grave's disease) and toxic adenomatous goiter. In Grave's disease hyperthyroidism appears to be associated with the diffuse hyperplasia of the thyroid gland. Toxic adenomatous goiter is associated with single or multiple nodules and variable histologic pattern. It is most similar to the disorder seen in human being. Hyperthyroidism is probably the most common endocrinopathy affecting cats older than 8 years with average 13 years. There has been no gender or breed predisposition.

Hyperthyroidism in cats is a condition always arise as a primary autonomous condition of thyroid gland and rarely due to pituitary and hypothalamus disorders (Bruker Davis.,1999). Benign tumours are common and carcinomas are rare involving one or both thyroid lobes are occurring usually in old cats. Approximately 70-75% have benign adenomatous condition involving both the lobes. The lesions are histologically similar to nodular hyperplasia or adenomatous goitre in human (Jenifer Wakeling *et al.*, 2007).

Although most commercial cat food contains relatively large amount of iodine, studies have failed to demonstrate correlation between dietary iodine and feline hyperthyroidism. Commercial cat food and an environment contain a variety of other goiterogens, which includes phthalates, resorcinol, polyphenol and polychlorinated biphenyl. Most of them are metabolized via glucuronidation by liver, the process that is usually slow in cats. There is twofold to threefold increase in risk of developing hyperthyroidism among the cats fed on canned cat food. Cats that preferred fish flavoured or liver flavoured canned cat food had increased risk of hyperthyroidism (Martin *et al.*, 2000). Thyroid gland contains more selenium per gram than that any other tissue. Selenium exerts biological activity through expression of selenoproteins to prevent oxidative damage. Because selenium is also growth factor, may play role in development of toxic goitre. High selenium concentration may affect feline health (Foster *et al.*,2001). Further research in this regards is anticipated.

Hyperthyroidism can be diagnosed in most cats based on:

1. Clinical Signs
2. Palpable thyroid nodule
3. Laboratory findings
4. Abnormal increased in ${}_tT_4$ concentration

Clinical signs:

Hyperthyroid cats have variety of clinical signs that reflect multiple organ dysfunction. weight loss, thinness, atrial fibrillation, anxiousness, muscle weakness and tremors. Mild to moderate increased blood pressure have been documented. Most frequent sign includes heat intolerance, apathy and diarrhoea. Signs are generally gradual and progressive which often delays owner's recognition of the problem. About 92% cats showing weight loss, 61% polyphagia and 47% having polyuria and polydipsia. Weight loss and polyphagia are extremely common signs. The cats previously thought to be finicky in eaters may develops excellent appetite. Cat is described as ***"Always Hungry Cat"***. Clinical signs affected by duration of hyperthyroid state and presence and absence of non- thyroidal illness. The nervousness of hyperthyroid cat is characterised by restlessness, irritability and aggressive behaviour. The most common signs referable to GIT are polyphagia, stool may be soft, bulky, foul smelling. Vomiting is more common and steatorrhea.

Physical examination:

In normal healthy cat thyroid lobes are located just below the cricoid cartilage and extended ventrally over the first few tracheal rings. Thyroid lobes are not palpable in normal cats. Hyperthyroidism invariably associated with enlargement of one or both lobes (more than 91% cases). Increased weight of the lobes associated with adenomatous hyperplasia of the thyroid tumour causes migration of these lobes ventrally in the neck. Typical signs of ventroflection of the neck due to weakness of neck muscles.

Laboratory Diagnosis:

Routine laboratory investigation provides valuable indications of thyrotoxicosis and help to detect concurrent problems. Haematology shows increased PCV, Leucocytosis, Lymphopenia. Serum chemistry indicate that more than 90% of the hyperthyroid cats exhibits abnormalities in serum ALT, AST, increased BUN, creatinine, hyperphosphatemia. Serum cholesterol concentration usually normal in hyperthyroid cats, Lipolysis results in increased FFAs concentration. Specific gravity of the urine will be more than 1.035.

Hormone assay:

Thyrotoxicosis results in excessive production and secretion of T_3 and T_4. Measurement of serum total T_4 and T_3 concentrations is commonly used to assess thyroid gland function in veterinary medicine. Measurement of random basal serum total T_4 concentration has been extremely reliable in identifying the cats with hyperthyroidism (Nelson and Feldman, 2004). Serum total T_4 concentration is more reliable than basal serum T_3 levels. Commercial veterinary laboratories have now included serum T_4 concentration as a component for feline chemistry profile. In most recent studies serum ${}_tT_4$ concentration were above normal range in 91% of hyperthyroid cats. If the cat having serum ${}_tT_4$ concentration within reference range, it is recommended to repeat the test and second to assay the serum fT4. Any abnormally increased serum ${}_tT_4$ strongly support the diagnosis of thyrotoxicosis especially when appropriate clinical signs are present. The feline reference range is 0.8-2.0 µg/dl. Hyperthyroid cat may have serum ${}_tT_4$ value between 2.0-5.0 µg/dl.

Many studies demonstrated that non thyroidal illness can lower T_4 concentration and decrease their value in cats with hyperthyroidism. T_3 is biologically active hormone, however the primary hormone secreted from canine and feline thyroid gland is T_4. Assessment of thyroid gland function in cats suspected with hyperthyroidism. T_3 is biologically active thyroid hormone. However, the primary hormone secreted by canine and feline thyroid gland is T_4, which is metabolized to T_3 at cellular level. The assessment of thyroid gland function in cats suspected with hyperthyroidism has been more reliable with measurement of randomly obtained serum T_4. The advantage of assessing serum ${}_tT_4$ is that it is more sensitive than serum T_4 in hyperthyroid cats. But the disadvantage is that it is less specific.

The clinician should gain a suspicious of thyrotoxicosis based on the careful review of the history and physical examination. Careful palpation of cat neck at the area of thoracic inlet is important. Most cats with thyrotoxicosis have a palpable thyroid mass. If thyroid mass is not palpable the clinician should consider that the thyroid tissue might be in the mediastinum. The diagnosis of thyrotoxicosis can be usually being confirmed by evaluation of single random serum total T_4 (${}_tT_4$). If a cat that appears to be hyperthyroid does not have a diagnostic baseline serum ${}_tT_4$, the test can be repeated days to week later along with serum ${}_fT_3$ concentration. Failure to observed abnormally increased serum ${}_tT^4$ does not rule out the diagnosis of hyperthyroidism, if the clinical signs are consistent. If the serum hormones fail to confirm thyrotoxicosis radionuclide thyroid scan should be considered. Finally, a possible response to methimazole therapy would also support the diagnosis. However, trial therapy should be considered as a last resort. Surgical exploration of the neck to identify a thyroid mass in an unconfirmed case is not recommended.

I_{131} and 99MTc (Pertechnate) provide excellent thyroid images. 99M Tc is commonly used and best radionuclide for the routine imaging of thyroid gland in human and cats. 99M Tc concentrate primarily in three tissues, the thyroid lobe, salivary gland and gastric mucosa. The normal size of the thyroid gland is 1:1 ratio of the salivary gland.

Treatment:

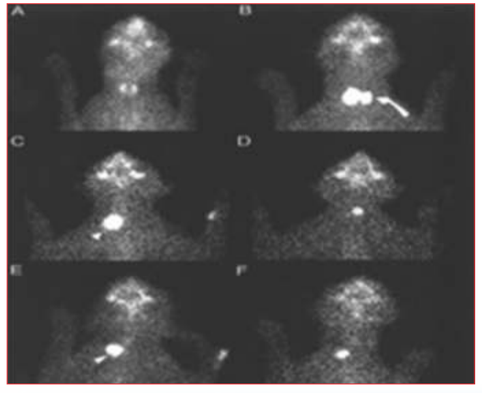
Thiouracil, Propyl thiouracil (PTU) and Methimazole are drugs used for the treatment of thyrotoxicosis. PTU and Methimazole blocks the synthesis of thyroid hormones by inhibiting organification of iodide. Carbimazole is metabolized to methimazole. Methimazole plasma half-life is 4 to 14 hrs in human. Methimazole is indicated in treatment of thyrotoxicosis. It is relatively inexpensive, readily available, relatively safe and considered as a drug of choice for the management of feline thyrotoxicosis. Methimazole carries no risk of permanent hypothyroidism. Initial dose of Methimazole 2.5mg twice a day for two weeks. most cats require 3 to 7.5 mg / day of methimazole for control of hyperthyroidism (Nelson and Feldman, 2004).

Surgical Treatment:

As thyroid is easily accessible in hyperthyroidism surgical treatment, can correct the thyrotoxicosis. It is relatively inexpensive procedure and sophisticated equipment's are not required. Surgical removal of thyroid results into permanent cure. But major disadvantages of the surgery are that, is the risk of anaesthesia in elderly and fragile cats. It may result into Iatrogenic hypothyroidism and hypoparathyroidism, recurrent laryngeal nerve damage or failure to remove all abnormal thyroidal tissue. In an attempt to minimize presurgical and postsurgical complications hyperthyroid cat should be thoroughly evaluated for co-existing illness prior to surgery like CHF, renal failure, cachexia etc. Reduce surgical and anaesthetic complications by controlling thyrotoxicosis prior to surgery. Surgery must be approach as an elective procedure and as a last resort, not one that must be performed hastily. Most serious complications associated with bilateral thyroidectomy is postsurgical hypocalcaemia. In most cats that retain parathyroid gland activity hypocalcaemia is mild and transient (Nelson and Feldman, 2004).

Thyrotoxic cats, *Courtesy: Google search images*

Palpable thyroid nodule, *Courtesy: Google search images*



Thyroid scan, *Courtesy: Google search images*

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Proud moment for Dr. Ami Sanghavi and PPAM family

D. Y. Patil International School conferred DYPIS Women Warrior award to Dr. Ami Sanghavi saluting her contribution towards ailing animals, birds, strays and pets during the Covid pandemic. Dr. Ami Sanghavi has been a selfless frontline warrior especially when the entire nation went in a lockdown and people enjoyed the privilege of staying at home. The entire PPAM family congratulates Dr. Ami Sanghavi for her achievement.

Cleanliness for The Cat of Your Dreams

Dr. Dhananjay Pandit
National Vet Affair Manager Scientific Remedies Pvt Ltd.

Your cat is the sweetest, most adoring love of your life...until they drop a land mine in their litter box that's toxic enough to clear buildings and send villagers running for the hills. If your cat's litter boxes are always a little too... ripe... here are some simple tips and tricks to tame the smell.

When cat litter was invented in 1947, it was made of grains of absorbent clay called Fuller's earth. There was just one brand, called Kitty Litter, and cat parents had a choice between that or natural sand or sawdust. Let's start with scent. A cat's sense of smell is far better than yours. Cats have from two to forty times as many smell-receptor cells in their nose as you do. That means scents that might seem light and pleasant to you can be overwhelmingly strong to them—especially since they are standing right in the litter.

Litter preference—It's Cattitude!

Not surprisingly, then, studies tell us that cats prefer unscented litter. That doesn't just mean added scents and scented deodorizers; it also applies to scents that might occur naturally in the litter, such as pine. Cats prefer their litter to smell like nothing at all.

You may be tempted to buy the litter that appeals most to you; maybe it tracks less or smells good or is inexpensive or is environmentally friendly. But it's your cat who has to step in it every day, so really, it's only fair to let her choose. It's important to scoop your cat's litter box at least twice a day, even if it doesn't smell.

Dr. Dhananjay Pandit

Smaller litter particles

Cats tend to prefer fine particle litters, as opposed to pellet and crystal-type ones. It makes sense, of course, given that cats were originally desert-dwelling animals that buried their waste in sand. Not to mention that a finer particle feels better on their paws. I mean, would you rather walk barefoot on a rocky beach, or a soft, white sandy one? Similarly, your cat will probably prefer fine particle, clumping clay litters.

Odour free

Cats tend to prefer unscented litters to scented ones. Your cat's nose and sense of smell is quite a bit more fine-tuned than yours. So, to play it safe, you should resist the urge to get a scented litter, whether that's a flowery scent or any other kind. Opt for unscented litter instead.

Fast & hard clumping

This will help minimize messes and make it easier for you to scoop/clean, not to mention minimising the chances that urine-soaked clumps of litter will stick to your cat's paws or tail.

Odour absorbent

Nobody likes the smell of cat pee or poo! Baking soda or activated charcoal can be added around the litter box or directly to the cat litter — either manufactured into the litter itself, or added by you after the fact. This can help keep ammonia and other litter box odors in check.

Low dust

This isn't just important to keep your floors, furniture, and electronics free from a fine layer of litter dust, it's also important for keeping yours and your cat's lungs clean. And that last part is especially important if you, your cat, or anybody else in your home has asthma.

Low tracking

It's safe to say that you want your cat's litter to stay in their box and not get tracked around the home. You should be able to find an anti-track litter that suits your cat's needs and your own. Even if you can't, there are a number of anti-tracking cat litter mats on the market that will keep the litter where it's meant to be.

Litter box rules

There are four common conditions/scenarios where special litters might be needed—1. Cats with asthma 2. Cats recovering from surgery 3. Cats who need help learning (or remembering!) to use their litter box 4. Diagnostic or medical litter.

Number of litter boxes

The general rule is to have one more litter box than the number of cats you have — it's called the “n+1 rule.” For example, 2 cats=3 litter boxes, and so on.

Size of litter box

Make sure the litter boxes you choose for your cat are large enough for your cat to fit inside comfortably, with some room to spare. They should have ample space to move and dig around in it, without having to step out. There should be plenty of space for them to easily avoid any 'deposits' that are still around from earlier visits. As a general rule, the correct size litter box should be at least as long as your cat, from their nose to the tip of their tail (when extended), and its width should be at least as wide as your cat is long (with their tail not extended).

Best box height for most cats: For cats who aren't 'sprayers', or don't routinely kick litter out of their boxes, a box with walls around 5–7” high is typically great (especially if the box is large).

If you've got a 'sprayer', 'kicker', look for boxes with three sides that are tall enough with wall heights of around 8–12” are good, but that also have a lower entry/exit side to make getting in and out easy (this side should be around 5–6”).

Best box height for mobility issues

If you've got a young kitten or any cats with arthritis or other mobility problems, then you'll definitely need boxes with at least one side that's super low. For most of these cats, an entry/exit side that is around 2.5–3.5” typically provides a good balance of ease of entry/exit for your cat, while still being able to keep litter in.

Covered and uncovered litter boxes

Some cats prefer an uncovered box, others don't. So feel free to go either way here or to test it out by giving your cat a selection of boxes to choose from. Just be ready to adapt if your cat starts giving you indications of a clear preference one way or the other. If you do go the 'covered' route, just make sure the opening isn't too small or difficult to get to, and be ready to switch to uncovered boxes should your cat ever develop asthma or arthritis. For older cats, opt for low entry model to avoid litter mess from leaping.

Placement is the key

Ideally, your cat should have at least two ways to get to and from each box. This is to keep their box from becoming completely blocked (e.g., by the family dog, a bully cat, a closed closet door, etc.). If they can't get to or away from their box reliably, they're not likely to use it reliably.

Plenty of space between

Even if you have the right number of boxes, it's just as important to spread out your cat's litter boxes to prevent problems.

Good air circulation

Your cat's nose is quite sensitive, and cramming their litter box in a small cupboard or a dingy basement is likely to force them to deal with scents and odors that could stress them out and dissuade them from using their box.

Drafty vents

Heating and air conditioning vents can create unpredictable (as far as your cat's concerned) drafts of air that can startle and stress out your cat. Try to avoid locating their litter boxes near such vents.

Foot traffic

If your cat has to cope with the possibility of a bunch of people walking (or running, especially if you've got small children in your home) by their loo every time they've got to go, it definitely won't be comfortable or fun for them. Try to find a place that doesn't get too much foot traffic.

Noise

Going to the bathroom is a fairly vulnerable scenario for cats, and they can often be on 'high alert' when in their box. If they're doing their business in an area where there's a lot of noise — especially if the noise is loud or sudden — then your cat isn't going to be able to go in peace. Though laundry rooms are common places for people to put their cat's litter boxes, the noise from a clunking clothes dryer or the end-of-

cycle alarms from either machine can be enough to stress out your cat when they're feeling exposed. Try to avoid the laundry room if you can.

Catliness is cleanliness

The best way to reduce litter box smells is to get rid of the stuff that's smelly. Clean the boxes at least once per day (preferably twice). Not only will your cat be happy; your nose will be, too. Clumping litters can often be the easiest to scoop and keep clean, and having a low-dust litter is important, especially if you've got a cat with asthma (or have it yourself).

Wash thoroughly

If you're scooping at least once per day, then it will be far easier to clean the boxes when the time comes. Once per month, empty the litter from your cat's boxes and scrub them thoroughly (it might go without saying, but be sure to wear gloves to protect yourself from any urine and fecal pathogens that can also infect humans). Simply use soap and water to clean the boxes. The smell of bleach and other chemicals from harsh cleaners can cause your cat to avoid their box even after it's clean. To finish up, dry the boxes and addfresh litter.

Replace the boxes

Over time, the boxes can become scratched from the frequent clawing as your cat buries their waste. These scratches are great places for bacteria to hide out and build up a smelly residence. Make sure to replace the boxes about once per year. When looking for a litter box for your cat(s), keep these features in mind—the box should be at least as long as your cat from the tip of their nose to the tip of their (extended) tail; at least one of the sides should be low so that your cat can comfortably and easily get in and out.

Baking soda

If you're still having odour problems, try sprinkling a little baking soda on the bottom of the box before you add fresh litter each week, or place an open box of baking soda in the same area as the box. This can help absorb some of the smells, but without adding irritants that will upset your cat's sensitive nose and lungs. Or try the Zero Odor Litter Box Odor Eliminator, which resulted in 'significantly fewer behaviours associated with feline litter box dissatisfaction and fewer undesirable eliminations," according to study. Activated charcoal also works well at absorbing odors. Whatever you do, don't use perfumes or sprays near the box. This might temporarily mask a smell, but it will irritate your cat's sensitive nose and lungs (or worse). In fact, using sprays, perfumes, and other scents might even discourage your cat from using their boxes at all.

Cleanliness is godliness

Use a good enzymatic cleaner to take care of any potty accidents if your cat misses the box (such as right next it). A good, thorough cleaning will eliminate the smell, prevent odours from developing over time, and prevent your cat from going outside of their boxes in the future. An effective cleaner works to neutralise the odour. If your cat is going outside their box, like on your living room carpet, then getting the smell out effectively can help prevent them from sniffing it out and choosing that same potty spot again.

Think like a cat

Think like a cat. In order to make a happy, comfortable home for cats, you need to think like one.

Condolences Dr. Vaibhav Vasant Zunjare

The PPAM family lost one of its most active members Dr. Vaibhav Vasant Zunjare along with his wife, child and mother in a tragic road accident on the Mumbai-Pune highway on 16.02.2021.

Born on 15th June 1979, Vaibhav graduated from Mumbai Veterinary College in 2001 and did his post-graduation in Veterinary Surgery from College of Veterinary Sciences, Parbhani. He was working as Veterinary Officer in NMMC since 2010 and was actively involved in animal welfare issues of Navi Mumbai. He was handling the COVID19 management facility of NMMC.

Dr. Vaibhav Vasant Zunjare a beautiful soul, full of love and faith, ascended to haven, away from us, but closer to god.

We pray for a healthy and bright future for his son, Arnav and May the lord provide strength to his Father and Brother to bear with this irreparable loss.

Endoscopic examination of snakes by access through an air sac

V. Jekl, Z. Knotek

Sixteen boa constrictors (Boa constrictor), three royal pythons (Python regius) and 15 Burmese pythons (Python molurus bivittatus) were examined endoscopically by access through the air sac. The snakes were immobilised in a ventral position using a half-open anaesthetic system with assisted ventilation and a mixture of isoflurane and oxygen. The rigid endoscope was introduced percutaneously and the internal structure of the lungs and the air sac, and the shape, size and external surface of the liver were visible in the cranial direction. In the smaller snakes the bifurcation and caudal part of the trachea could be viewed, provided the endoscope was positioned in a retrograde orientation. The caudal orientation of the endoscope made it possible to view the gall bladder and the size, shape and surface of the spleen. In some cases, the pancreas and the surface of the stomach and colon could be monitored. Endoscopy through the air sac also made it possible to check the major veins in the coelom. The snakes were monitored for at least 30 days after the intervention and no changes in their respiratory function or general health were observed.

ENDOSCOPIC examinations are used to help diagnose diseases in small mammals, birds, reptiles and fish (Taylor 1999). The techniques and the results of endoscopic examinations have been described in numerous papers (Frye 1991, Jenkins 1996, Divers 1999, Schildger and others 1999, Taylor 1999, Hernandez-Divers 2004). In small mammals, the organs in the abdominal cavity can be distributed more evenly and observed more readily by insufflating the cavity. However, in reptiles the individual organs are less fixed in the coelom and they can move during an examination, making it more difficult to direct the endoscope and prolonging the time required for an endoscopic examination. Furthermore, the anatomical differences between reptilian species necessitate the application of different approaches, and affect both the complexity and the effectiveness of the examinations. The examination of the coelom is based on the insufflation method (Hernandez-Divers 2003), and without insufflation some organs or tissues are almost inaccessible (Schumacher 2003). In birds the air sacs are traditionally used to get a better view of the organs in the coelom (Lumeij 1987, Ritchie 1994, Hochleithner 1997, Krautwald-Junghanns and Trinkhaus 2000). Snakes and some lizards also have air sacs, which are a direct continuation of the caudal part of the lungs and stretch as far as the second third of the coelom. Their size and capacity vary with the species (Wood and Lenfant 1976, Keogh and Wallach 1999) and they are relatively poorly vascularised. Their volumes are significantly increased during inspiration, resulting in a distension of the body wall. The aim of this study was to use a modified endoscopic method to access the coelom of snakes through the air sac, so that the air passages could be examined directly, and the other organs could be assessed indirectly.

MATERIALS AND METHODS

Sixteen boa constrictors *(Boa constrictor)*, three royal pythons *(Python regius)* and 15 Burmese pythons *(Python molurus bivittatus)* with a history of lethargy, sneezing, dyspnoea and star gazing were examined. They were housed in vivaria in which the temperature ranged from 25 to 40°C during the day and from 20 to 25°C during the night; the light regimen consisted of 14 hours of light and 10 hours of darkness. The snakes were not fed for five days before the endoscopic examination but had unlimited access to water. They were examined clinically, haematological and biochemical tests were made, and they were premedicated with 10 mg/kg enrofloxacin (Baytril; Bayer) administered intramuscularly every 24 hours.

Endoscopic equipment

The snakes were examined with rigid endoscopes of different sizes for the large or small snakes (Hopkins Documentation Forward-Oblique Telescope 64018 BS, ø 2·7 mm, 18 cm; Hopkins Forward-Oblique Telescope 67208 B, ø 2·7 mm, 11·8 cm; Hopkins Forward-Oblique Telescope 64017 B, ø 1·9 to 2·1 mm, 19 cm; Karl Storz, Wolf telescope ø 4·0 mm, 30 cm), an examination sheath (67065 CC; Karl Storz), and a xenon light source (Xenon Nova 20131520; Karl Storz). The image was scanned with an endoscopic camera (Endovision Telekam SL 20212001; Karl Storz) connected to a monitor (Sony) and a video recorder (SVHS ET; JVC).

Anaesthesia

The snakes were immobilised in a ventral position on a thermal pad at 38°C. A half-open anaesthetic system with assisted ventilation (Anesco) was used. For excessively active or aggressive snakes, additional premedication with 0·1 to 0·25 mg/kg medetomidine (Domitor; Fermion) and 5 to 20 mg/kg ketamine (Narkamon 5 per cent; Spofa) or 3 to 8 mg/kg tiletamine with zolazepam (Zoletil; Virbac) was applied. The snakes were intubated with an endotracheal tube 2 to 5 mm in diameter, depending on the size of the trachea (Blue Line Tracheal Tube; Portex). No local anaesthetics were used. A mixture of isoflurane and oxygen (Isofluran Rhodia; Torrex Pharma) was used for the general anaesthesia, 5 per cent isoflurane being used for induction and 2 to 4 per cent for maintenance. In the initial stage each

FIG 1: *Endoscopic view of the liver (medium part) and large veins of a five-year-old female boa constrictor (Boa constrictor) weighing 3·6 kg. The structure of the air sac is visible*

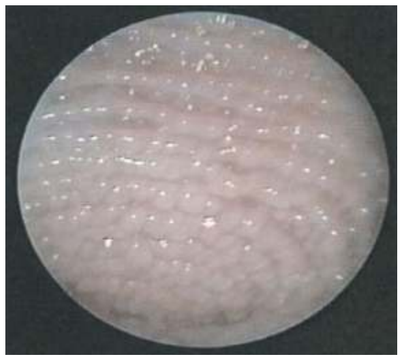

FIG 2: *Endoscopic view of the structure of an air sac fold in a six-year-old female Burmese python (Python molurus bivittatus) weighing 6·8 kg*

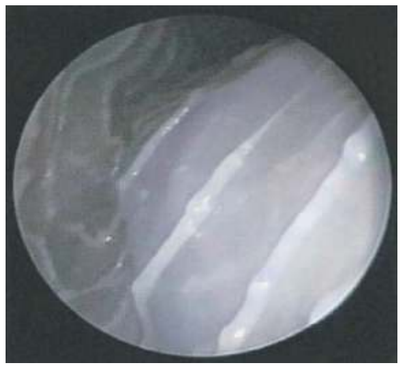

FIG 3: *Endoscopic view of the structure of the air sac in a two-and-a-half-year-old female boa constrictor (Boa constrictor) weighing 1·3 kg*

FIG 4: *Endoscopic view, from the insertion site, of the liver of a two-year-old male boa constrictor (Boa constrictor) weighing 1·5 kg*

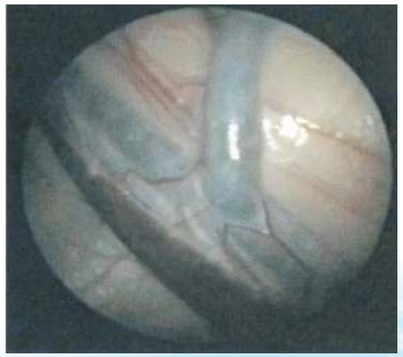

FIG 5: *Endoscopic view of the caudal edge of the liver and hepatic vein of a five-year-old female boa constrictor (Boa constrictor) weighing 3·6 kg*

snake was ventilated at 10 to 16 breaths per minute, but when the lateral reflex had disappeared the ventilation rate was reduced to six to eight breaths per minute.When closing the muscular layer the flow of isoflurane was discontinued and only oxygen was supplied. After suturing the skin, each snake was extubated and placed in a clean, warm vivarium, and its condition was monitored for at least 30 days after the examination.

Description of the method

After aseptic preparation, a short incision was made in the skin on the right side of the snake's body, at 35 to 45 per cent along its length and parallel with the horizontal axis of the body. The air sac is situated in this area. The incision was made between the second and third row of lateral skin scales, and it ranged in length between 1 and 2·5 cm. A blunt perforation of the muscle layer and the peritoneum was then made. When the air sac was reached, two absorbable fixation sutures (Vicryl 4-0; Ethicon) were made in its wall. The endoscope, with an examination sheath, was introduced through a small incision made in the air sac between the two sutures. After selected organs in the coelom had been observed, the air sac was closed with absorbable horizontal U-sutures (Vicryl 4-0; Ethicon). The muscle layer was closed with a simple continuous suture, and the skin was closed with a non-absorbable, continuous, horizontal U-suture (Ethilon 3-0; Ethicon) and covered with disinfectant solution (Novikov).

RESULTS

The method was used to image the internal structure of the air sac and lungs (Figs 1, 2, 3) and the shape, size and external surface of the liver (Figs 4, 5) in the cranial direction from the insertion site. The heavily perfused lungs could easily be distinguished from the air sac, whose vascularisation is much poorer. On the ventral side of the lungs, running towards the air sac, there is the main bronchus, a narrow tube that is a direct continuation of the trachea. In small snakes, even the bifurcation and the caudal part of the trachea can be viewed by using a retrograde orientation of the endoscope (Fig 6). Where there are pathological changes, the affected part of the lungs can be imaged (Fig 7) and samples for laboratory tests can be taken under endoscopic control. The liver lies behind the external wall of the lungs and the air sac. It is surrounded by the Glisson's sheath. Owing to the grey-white colour of the wall of the air sac and the Glisson's sheath, the liver seen through the air sac appears grey-brown to red-brown.

When the endoscope was oriented in the caudal direction, the shape, size and external surface of the liver, spleen and gall bladder (and in some cases the pancreas and the external wall of both the stomach and the colon) could be viewed. The technique was also a good method for checking the large veins of the coelom. The principal changes observed are listed in Table 1.

FIG 6: *Endoscopic retrograde view of the bifurcation of the trachea in a one-and-a-half-year-old female royal python (Python regius) weighing 1·28 kg*

FIG 7: *Endoscopic view of purulent pneumonia in a six-year-old female Burmese python (Python molurus bivittatus) weighing 12·4 kg, showing the oedematous lung wall with considerable empyema*

DISCUSSION

Endoscopic examinations are valuable for the diagnosis of diseases of the respiratory system of snakes (Frye 1991, Rübel and others 1991, Knotek and others 1999, Schildger 2000, Schumacher and Toal 2001, Jekl 2002, Chai and others 2004), but their value depends on the anatomical structure of the lungs (Wood and Lenfant 1976, Fowler 1986, Funk 1996, Keogh and Wallach 1999,Wyneken 2001). A method based on an examination of the lungs through the trachea, was described by Divers (2001). Owing to the restricted length of most endoscopes, the use of a rigid endoscope is limited to the examination of the upper respiratory system (Diethelm and others 1996); flexible endoscopes are recommended for examining the lungs and the air sac of larger specimens (Divers 2001). The approach through the air sac provides an alternative method for examining the caudal segment of the respiratory system of large snakes. The method proved safe; no changes in respiratory function or in the general health of the snakes were observed during the 30 days they were monitored after the examination.

During the endoscopic examination through the air sac, the internal structure of the lungs and the air sac can be assessed in detail (Jekl 2003, Knotek and Jekl 2003, Chai and others 2004). The method can be used to take samples of the mucosa of individual segments of the respiratory system for microbiological and histological testing. Sample contamination is minimised and samples can be taken from the sites of pathological change. The access to the coelom through the air sac makes it possible to visualise other organs. The results of this study show that the method makes it possible to assess indirectly the state of the large veins, the size and shape of the liver, gall bladder and spleen, and in some cases the external wall of the stomach and intestine.However, it is not possible to make direct contact with the surface of the organs in the coelom and, as a result, their colour is distorted. Furthermore, it would probably be more difficult to visualise the organs of snakes with serious respiratory disease.

TABLE 1: Endoscopic changes observed and final diagnoses in the snakes examined

Species	Number	History	Endoscopic changes	Diagnosis
Royal python (*Python regius*)	1	Apathy, dyspnoea	Oedema of the tracheal mucosa with petechial haemorrhages	Tracheitis
Royal python	1	Hypersalivation	No endoscopic changes	Stomatitis
Royal python	1	Dyspnoea	Calcification of lungs	Gout
Burmese python (*Python molurus bivittatus*)	3	Sneezing, dyspnoea	Oedema of the tracheal and lung mucosa, small amount of mucus in the lung	Tracheitis, pneumonia, IBD (suspected)
Burmese python	3	Sneezing, dyspnoea	Oedema of the tracheal mucosa, tracheal discharge, oedema of the lung mucosa, accumulation of pus in the lung	Tracheitis, severe pneumonia, IBD (suspected)
Burmese python	1	Sneezing, dyspnoea	Oedema of the tracheal mucosa, tracheal discharge, oedema of the lung mucosa, accumulation of pus in the lung	Tracheitis, severe pneumonia, IBD (confirmed by histology)
Burmese python	1	Dyspnoea	No endoscopic changes	Hepatopathy
Burmese python	2	Dyspnoea	No endoscopic changes	No gross pathology
Burmese python	1	Dyspnoea	Oedema of the lung mucosa	Pneumonia
Burmese python	4	Dyspnoea	Oedema of the tracheal mucosa, liver pale in colour	Tracheitis
Boa constrictor (*Boa constrictor*)	6	Star gazing, dyspnoea	No endoscopic changes	IBD (suspected)
Boa constrictor	1	Star gazing, dyspnoea	No endoscopic changes	IBD (confirmed by histology)
Boa constrictor	1	Dyspnoea	Oedema of the tracheal mucosa, liver pale in colour	Tracheitis
Boa constrictor	4	Dyspnoea	Oedema of the lung mucosa	Pneumonia
Boa constrictor	2	Dyspnoea	No endoscopic changes	No gross pathology
Boa constrictor	1	Apathetic dyspnoea	No endoscopic changes, liver yellow in colour	No gross pathology
Boa constrictor	1	Apathetic	Liver red and yellow in colour	Hepatitis IBD (suspected)

IBD Inclusion body disease

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Current Concepts in Veterinary Ophthalmology Examination of the eye. PART-3

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Intraocular Pressure Measurement (Tonometry)

The routine use of Schiotz tonometry is more accurate than digital tonometry, is inexpensive and is a valuable diagnostic aid. The tonometer consists of a corneal footplate, plunger, holding bracket, recording scale, and 5.5, 7.5, 10.0 and 15.0 gm weights. The low friction plunger within the corneal footplate indents the cornea proportional to intraocular pressure. The accuracy of Schiotz tonometry depends on the clinician, patient and instrument.

Measurement of IOP with the Schiotz tonometer in small animals is relatively easy. Topical anesthetic is applied to both eyes. The animal is placed in a sitting position, or lateral or dorsal recumbency. During restraint of the animal, the area around the jugular veins is avoided to prevent increased venous pressure. The eyelids are held open some distance from the lid margins, usually at the bony orbital rim. The animal's head is elevated dorsally and a few seconds are permitted for the globes to move upward. The Schiotz tonometer is held vertically and placed on the center of the cornea just long enough for the scale to be read. The conversion table provided with the instrument (for humans) is adequate for IOP estimation in the dog and cat. The tonometer must be kept clean to insure accurate results and reduce the chance of ocular contamination.

Applanation tonometers (especially the Tonopen type) are very accurate and easy to use. Applanation tonometers are becoming more common in practices. The Tonopen applanation tonometer has made it much easier to diagnose and treat the animal glaucomas.

IOP is 16.8 ± 4.0 mm Hg in dogs
20.2 ± 5.5 in cats
23.2 ± 6.9 in horses

Direct ophthalmoscopy

Direct ophthalmoscopy is used more frequently by practitioners than indirect ophthalmoscopy. However, both techniques have advantages that complement each other when used together. The method is termed "direct" because a condensing lens is not positioned between the ophthalmoscope and the patient's eye. The examiner has a direct optical image of the patient's eye. The fundus image is real, upright and approximately about 17 to 19 times magnified in dogs and cats. The fundus area visualized is about 10 degrees or approximately 2 disc diameters. The direct ophthalmoscope head also offers a range of lenses to enable focusing at various depths within the eye. These lenses are calibrated in diopters. A lens with a power of 1 diopter will focus light from an infinite source (parallel rays) at 1 meter. The higher the diopters, the more converging

power the lens possesses. Negative diopters denote diverging lenses. When an emmetropic eye (observer) looks into an emmetropic eye (patient) with an ophthalmoscope the retina of the patient should be in focus at the 0 diopter setting. Minor lens corrections are usually needed to focus on the patient's fundus. Within the eye, a distance of 3 diopters equals 1 mm.

In performing ophthalmoscopy, the patient's body and head are minimally restrained by an assistant. The examiner holds the muzzle and/or lids with one hand and with the other hand holds the ophthalmoscope to make the necessary diopter changes. It is preferred to view the tapetal fundus several inches from the patient and then move to 1 to 2 inches from the patient's eye when the optimum focus is achieved and the animal has adapted to the restraint. The diopter setting is usually started at "0" and adjusted to between +3 to -3 diopters to provide the sharpest image possible. By using more positive lenses the lens can be seen at +8 to +12 diopters and the cornea at +20 diopters.

Direct ophthalmoscopy has certain limitations. Penetration of cloudy or partially crystallized media is limited. Because of magnification, there is a small field of view. Examination of the peripheral fundus is difficult. There may be difficulty in compensating for refractive errors and eye movements. Stereopsis is absent, and depth of focus is limited. The small working distance between examiner and patient may be hazardous to certain species of animals. The PanOptic ophthalmoscope is available and provides an intermediate level of magnification to the direct and indirect techniques.

Phoneoscopy using smartphones is very useful. They function as digital direct ophthalmoscopes.

Indirect ophthalmoscopy

Indirect ophthalmoscopy complements direct ophthalmoscopy. Because the limitations of one are the advantages of the other, use of both techniques is desirable. To perform indirect ophthalmoscopy a fairly bright light source is directed into the eye. A condensing lens is interposed between the light source and the eye. Incident light is condensed to illuminate the fundus. The reflected light then is condensed by the same lens to form a virtual, inverted, and reversed image between the lens and the light source.

The advantages of binocular indirect ophthalmoscopy are penetration of cloudy media, large field of view (hence an excellent survey instrument), examination of the peripheral fundus, ease of compensation of refractive errors and eye movements, Stereopsis, greater distance between examiner and patient, two to three simultaneous observers and the ability to readily examine the more intractable patients with less hazard to the examiner. The disadvantages include less magnification for studying particular areas, and the need for drug-induced mydriasis. Indirect ophthalmoscopy can be employed with only a light source and a lens. Several commercial indirect ophthalmoscopes are available. Regardless of the light source used, the power and type of lens used determines the ease and accuracy with which the fundus exam will be conducted.

The indirect ophthalmoscope is adjusted so the light is slightly off center of the examiner's visual field (to reduce glare). The patient's muzzle is held gently and the lens is positioned three to five cm from the cornea and the upper eyelid retracted. The lens is usually held close to the cornea initially to permit observation of the ocular fundus and then moved away from the eye until the image is maximum size. When the hand lens is interposed between the light source and the eye, the fundus is visualized. Image magnification (2X to 4X) is dependent on the dioptric power of the hand lens. The +20 lens is the most versatile. Occasionally, an annoying light reflection occurs and is remedied by slightly tilting the hand lens. Image magnification is dependent on the dioptric power of the hand lens. The +20 D lens is the most versatile.

The canine lateral and axial magnification for the direct ophthalmoscope, and indirect lenses of 14, 20 and 30 D is 17.2 and 405; 2.6 and 9; 1.74 and 4; and 1.2 and 1.68X respectively. The feline lateral and axial magnification for the direct ophthalmoscope, and indirect lenses of 14, 20 and 30 D is 19.5 and 508; 2.9 and 11.3; 1.95 and 5.08; and 1.26 and 2.11 X respectively. The horse fundus is minified with 20 and 30D lenses, so only the 14D lens, or better yet, a 5D lens should be used.

Ocular ultrasonography

Ultrasonography has become increasingly useful in the diagnosis of intraocular disease in the past few years. High frequency sound waves are directed through the eye. A portion of these sound waves bounce off the tissue interfaces. These echoes are amplified and projected onto an oscilloscope. Echoes from the corneal surfaces, the anterior and posterior lens surfaces, the retina, and any abnormal intraocular material will project an image which aids intraocular diagnosis. This is especially useful when dense corneal opacity or mature cataract obscures the view of the fundus.

Ocular ultrasound

GLOBE AND ORBIT

The location of the bony orbit within the skull determines the degree of binocular vision. Animals with laterally positioned orbits, such as horses, have less binocular vision and less depth perception than due animals with eyes aimed more anteriorly, such as cats or dogs. Horses do, however, have better peripheral vision.

Most of the extraocular muscles arise from around the optic foramen, except for the ventral (inferior) oblique muscle. The orbital fascia is separated by adipose tissue which fills in the dead space in the orbit and acts as a protective cushion.

Periorbita is the conical fibrous membrane which lines the orbit and encloses the globe with its muscles, blood vessels and nerves. It attaches to the orbital bones and becomes the periosteum. At the orbital rim it splits, with one part becoming continuous with the periosteum of the facial bones, and the other forming the orbital septum which merges with the eyelids (tarsal plates).

Tenon's capsule surrounds the globe from its limbal insertion and joins the dura mater around the optic nerve. It is continuous with the fascia surrounding the extraocular muscles, and lies beneath the bulbar conjunctiva and superficial to the sclera.

There are 7 extraocular muscles found in most domestic species: 4 rectus (lateral, medial, dorsal, ventral); 2 oblique (dorsal and ventral); and 1 retractor bulbi. Cranial nerve III (oculomotor nerve) innervates the medial, dorsal, and ventral rectus as well as the ventral

oblique muscles. CN IV (trochlear nerve) innervates the dorsal oblique. CN VI (abducens nerve) innervates the lateral rectus and retractor bulbi.

CLINICAL SIGNS OF ORBITAL DISEASE

1. **Exophthalmos** means there is a normal sized globe that is more prominent than normal, or is protruding from orbit. This must be distinguished from buphthalmos (enlarged globe) that occurs with chronic glaucoma. Exophthalmos may be "normal" for brachycephalics due to shallow bony orbit. It is often mistaken for glaucoma.

Exophthalmos from orbital abscess

2. **Enophthalmos** occurs when the globe is sunken or receded into orbit. It may be transient (related to dehydration or debilitation), or permanent (loss of retrobulbar contents). Labradors, Rottweilers, Dobermans and Irish Setters are normally somewhat enophthalmic such that the medial canthus forms a **"pocket"** to collect dust and debris to result in a persistent medial canthal conjunctivitis

3. **Ophthalmoplegia** is impairment of eye movements. Normally the eye movements are **"yoked"** together. Ophthalmoplegia may be related to neurological dysfunction. Remember $LR_6(SO_4)_3$ - the lateral rectus is innervated by CN VI, the superior oblique by CN IV, and the inferior oblique and remaining rectus muscles innervated by CN III!

4. **Strabismus** is deviation of the visual axis of the globe. Again, this may result from neurologic deficit, as is seen in Siamese cats. Strabismus may also result from space occupying lesions of the orbit, or be due to muscle avulsion from a traumatic proptosis.

5. **Chemosis** is swelling and edema of the conjunctiva. Conjunctivitis (inflammation of the conjunctiva) may also occur.

6. **Protrusion of the nictitating membrane** (late sign; caused by compression of the nictitans against the bony orbit occluding venous drainage).

7. **Swelling of the eyelids** (orbital inflammations, venous stasis).

8. **Exposure keratitis** (failure of lid closure) often occurs with exophthalmic eyes.

9. **Periorbital swelling** (lateral wall) - (in neoplasia and orbital inflammations)

10. **Dysphagia.** The ramus of the mandible puts pressure directly on the retrobulbar soft tissues causing pain with retrobulbar abscessation. Exophthalmos with pain upon attempting to open the mouth indicates retrobulbar abscess, cellulitis, foreign body, or necrotic neoplasm. A swelling behind last upper molar may be observed with oral examination.

11. **Visual impairment and impairment of pupillary light reflexes** due to orbital disease affecting the retina or optic nerves.

TRAUMATIC ORBITAL DISEASES

Proptosis is forward displacement of the eye from the orbit. It is seen commonly with retrobulbar hemorrhage and edema following trauma. Often, there is sufficient trauma to cause stretching and/or tearing of extraocular muscles. Proptosis occurs fairly commonly in dogs (especially brachycephalics). Proptosed eyes should be evaluated for hyphema (blood inside the eye), pupil size, pupillary light responses, extraocular muscle damage, and duration of proptosis. All proptosed eyes should be fluorescein stained to evaluate for corneal ulceration. If there are favorable prognostic indicators (absence of hyphema, short duration, muscles intact, miotic pupil) the eye should be replaced. Most proptosed eyes do not regain vision unfortunately.

Keep the eye moist pre-surgically; this is something the owner can do on the way to the emergency clinic. Gently remove debris with copious sterile saline flushes. If the animal is stable enough to handle a short general anesthetic episode, replace the eye, performing a lateral canthotomy if necessary. A complete temporary tarsorrhaphy is performed and the sutures are kept in place 1-3 weeks (until lid tension is minimal). Replace the suture if lagophthalmos is present. Traumatic strabismus (usually esotropia or lateral deviation) may be corrected it still present after 6-8 weeks. Maintain medical treatment with systemic antibiotics, topical antibiotic ointment and atropine. Systemic anti-inflammatory drugs may be used to help decrease severe swelling of the periocular tissue.

Orbital fractures can result in displacement of globe and the potential for penetrating bone fragments. This is less common in dogs and cats because of an incomplete bony orbital rim. Episcleral or retrobulbar hemorrhage is often an indicator of trauma. These do not usually require anything except supportive treatment. Penetrating wounds, including foreign bodies from oral cavity and conjunctival foreign bodies do occur. Usually the foreign object needs to be removed or a secondary abscess may occur in the retrobulbar space.

INFECTIOUS/INFLAMMATORY ORBITAL DISEASES

Infectious or inflammatory orbital disease is usually secondary to a penetrating wound or to systemic disease. Conditions include abscesses, eosinophilic myositis, and extraocular polymyositis (see below).

ORBITAL NEOPLASIA

Retrobulbar tumors are generally highly malignant. Tumors can be primary (osteosarcoma of orbital bones; adenocarcinoma of zygomatic or lacrimal glands, etc.), secondary (extension of ocular or adnexal tumors eg. squamous cell carcinoma/melanoma), or metastatic (spread from distant location). Diagnostic tests include oral examination (animals with retrobulbar tumors are generally not painful when their mouths are opened), physical examination to evaluate for masses elsewhere, orbital ultrasound and aspiration for cytology, skull and chest radiographs, as well as MRI or CT.

Tumor eroding into mouth behind last molar.

Exophthalmos from orbital tumor

ENOPHTHALMOS

Enophthalmos is a recession of the globe in the orbit with reduction of orbital contents. It can be due to reduced orbital contents such as resorption of orbital fat, atrophy of muscles, cicatricial tissue formation following trauma, orbital surgery, and secondary muscle degeneration associated with advanced eosinophilic myositis. It can also be due to lack of muscle tone, as is seen with Horner's syndrome (oculosympathetic paralysis). Thirdly, it can be caused by a reduction in globe size with anophthalmos (absence of an eye) or microphthalmia (presence of a smaller than normal eye) and frequently with other ocular abnormalities. Most frequent in Collies. Phthisis bulbi is another cause of enophthalmos due to loss or contraction of intraocular tissues. This occurs following severe trauma, chronic inflammation, and after some intraocular surgeries.

Large and giant dog breeds have a unique orbital and eyelid conformation that creates *MEDIAL CANTHAL POCKET SYNDROME*. The eye is relatively enophthalmic creating a pocket in the ventral fornix where dirt and foreign bodies are frequently located. It does not respond to treatment, but most dogs do well with frequent cleaning.

EXOPHTHALMOS

Exophthalmos is protrusion of the normal sized globe from the orbit. The canine orbit is an incomplete bony structure which contains tissues of bone, muscle, nerve, fat, fascia, gland and vascular origins. Orbital space occupying masses result in alteration of anatomically defined tissue spaces, causing displacement of orbital contents. If a mass is located in the orbit, exophthalmos will be seen because the path of least resistance is forward.

Congenital causes of exophthalmos are rare, but include: arteriovenous fistula (pulse or fremitus may be detected through the orbital wall skin) and mucocele (salivary gland cyst). Acquired exophthalmos is much more common.

Appeal to PPAM Members to Renew Membership

1. **Renewal of Annual Membership** — **Rs. 1500.00 + GST (Rs. 270.00) = Total Rs. 1770.00**
2. **New Membership** — **Rs. 1750.00 + GST (Rs. 315.00) = Rs. 2065.00**
3. **Life Membership** — **Rs. 17500.00 (No GST)**

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