Anesthesia Essentials For Pet Owners

A QUICK REFERENCE GUIDE

VCA ANIMAL HOSPITALS
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How to use this booklet

This booklet is intended to be an educational resource in the areas of anesthesia, dentistry and pain management. The goal of this information is to help answer questions you may have and encourage discussion on these topics with your veterinarian. Each VCA hospital is unique and while each follows the principles in this manual, there will be variations in individual processes within hospitals. Please ensure that you ask your veterinarian if you have any questions about the anesthetic process. Your pet's health, comfort and safety is our top priority.

Contents

What is anesthesia?

Anesthesia is the use of medicine to prevent the feeling of pain, provide muscle relaxation and produce a hypnotic state to create a state of unconsciousness during a surgical or dental procedure. Anesthetic agents are given via injection or through inhaled gases with the goal of inducing analgesia (loss of response to pain), amnesia (loss of memory), immobility (loss of motor reflexes), unconsciousness and relaxation of skeletal muscles. It is very normal for pet owners to be concerned and have questions about anesthesia. This manual is designed to answer some of these questions and to be a resource to help generate discussion with your veterinarian.

What are the main goals of anesthesia?

- To create a safe, pain free, unconscious state to allow a procedure to be performed.
- To decrease anxiety, control pain and allow a safe recovery in the post-operative period.

How can we minimize risks and concerns related to anesthesia?

Technician monitoring vital signs

It is important to thoroughly discuss your pet's anesthetic and medical history with your veterinarian, including previous allergies, previous anesthetic procedures and current medications.

Your pet should have a full physical examination by your veterinarian prior to any anesthetic procedure. This is important to ensure normal vital signs and assess any physical exam abnormalities. During this examination your veterinarian will assess your pet's breathing, heart and circulation, body temperature, nervous system, eyes, ears, skin/hydration, lymph nodes, abdomen and limbs.

NORMAL VITAL SIGNS

Temperature	100.5-102.5^0
Pulse rate at rest (beats/minute)	Dogs: 80-120 bpm* * rates can be higher in puppies and small dogs Cats: 180-200 bpm
Respiratory rate	18-24 breaths/minute
Mucous membrane color	Generally pink
Hydration	1 second * pick up skin on nape of neck and should recoil in approx. 1 second

Follow your veterinarian's recommendations for a full pre-operative work up which could include blood work, urinalysis, blood pressure, electrocardiogram and chest radiographs.

Follow your veterinarian's pre-anesthesia feeding instructions strictly. This typically involves withholding food for approximately 10-12 hours prior to surgery. It is okay for your pet to drink normal amounts of water, unless instructed otherwise. This is very important as it ensures your pet will have an empty stomach during anesthesia and will decrease the risk of vomiting.

What safety checks and balances are put in place by the medical team?

THE PRE-OPERATIVE EXAM AND WORK UP...

- An anesthesia checklist is used for every patient. This increases patient safety by ensuring a double-check system by the technicians and veterinarian for every step in the anesthetic process.
- An emergency drug sheet is created for each patient and ensures that nurses are ready with the correct emergency drug dose in the rare instances it is needed. The risk of anesthesia-related deaths are 1 in 10,000 which is very low. Our teams are trained to respond to any emergency situation .
- As anesthesia can cause nausea in some patients, medications are often used in patients with a prior history of regurgitation or nausea, or in patients undergoing longer anesthetic procedures. This is why it is essential that no food is given to your pet for a period of time prior to anesthesia when at all possible.

- All patients have an intravenous (IV) catheter placed and are supported with IV fluid therapy throughout the procedure. IV fluid therapy is a key part of most anesthetic procedures as it is a key component in supporting blood pressure in patients under anesthesia.

- All patients receive pre-medications. These medications are given approximately 30 minutes prior to anesthesia and they help to decrease patient stress and anxiety, as well as to allow lower doses of subsequent anesthetic medications. Veterinarians choose pre-medications based on the patient's health status, the degree of pain associated with the procedure, the patient's temperament and the length of the procedure.

- Trained veterinary technicians are present for hands-on individual patient monitoring throughout the procedure and during the post-operative period.

- Anesthetic monitoring is an essential part of ensuring a safe procedure. When a veterinary patient is under anesthesia, their vital signs are closely watched in the same manner that human patients are monitored. We use state of the art equipment including blood pressure monitors, electrocardiogram monitors, pulse oximeters and capnographs. One of the main values that we measure is a patient's blood pressure. Because anesthetic drugs can cause a decrease in blood pressure a veterinary nurse closely monitors this measurement throughout anesthesia. Patients are kept on intravenous fluids during anesthesia to support blood pressure and each patient's anesthetic plan is individually tailored to their needs. Medication can be administered as needed to support blood pressure.

- Each patient is kept warm with a safe forced air warmer called a "bair hugger" (or something similar) throughout anesthesia. Smaller patients, cats and geriatric patients are at higher risk for a low body temperature (hypothermia) while under anesthesia.

- Strict post-operative recovery procedures are followed and include monitoring of vital signs, protection of the patient's airway, monitoring the level of sedation and continual assessment for signs of pain.

WHAT SHOULD I DO THE NIGHT BEFORE ANESTHESIA?

The night before anesthesia your pet can eat a normal meal.

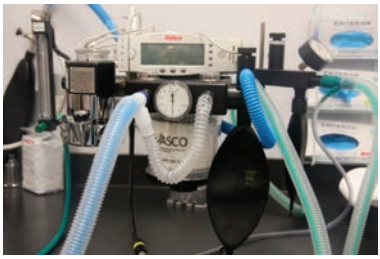
Your veterinarian will make specific recommendations, but typically it is recommended not to give food after midnight. Normal amounts of water are okay, unless instructed otherwise. Recommendations will often vary for diabetic patients, very small patients and neonates (patients < 2 months of age).

It is also a good idea to keep your pet's exercise to a moderate level the day before anesthesia and to minimize time spent in the sun, especially in warmer temperatures.

What happens to my pet when I "drop them off" at the hospital the morning of anesthesia?

Physical examination by a doctor

- This depends on the type of procedure. A typical plan during the "pre-operative period" is as follows:
- A technician will take your pet's vital signs, including body temperature, respiratory (breathing) rate, heart rate, blood pressure. A body weight will be recorded.
- A full physical examination is then performed by the veterinarian.
- Pre-operative blood work (and any other tests recommended) will either be performed, or if previously performed, results will be examined by the doctor.
- Your pet will be given a "pre-medication" which is a low dose of sedative and pain medication given to decrease anxiety approximately 30 minutes prior to anesthesia. This also allows treatment of pain pre-emptively (before it actually occurs in the surgery or dentistry) and allows for better pain control.
- Your pet will have a small area of hair on their 'wrist' (front leg) shaved and an intravenous catheter will be placed in their front leg. Your pet will then be started on IV fluids.



Anesthesia machine

IV catheter placed in a front leg

- Monitoring equipment and the anesthesia machine will be checked to ensure they are ready and the surgery or dental space is prepared.
- Your pet will then be given low doses of injectable anesthetics and when they become sleepy a soft plastic tube will be placed through the mouth and into their trachea (airway) to protect their lungs and to allow for delivery of gas. Each anesthetic drug dose is tailored to each individual patient.
- Once under anesthesia a trained technician will work closely with the doctor to monitor your pet's bodily functions such as breathing, heart rate and rhythm, body temperature, blood pressure and blood oxygen levels during surgery. All of these values are recorded on an anesthesia record and this will become part of your pet's medical record.
- Throughout the procedure your pet will be kept warm with a safe warming blanket system called a 'bair hugger'(or something similar).

How long will my pet take to recover from anesthesia?

This depends on the length and type of procedure as well as the anesthetic drugs used, but most pets recover quickly from anesthesia. Once the anesthetic gas is discontinued most pets are awake on oxygen within approximately 10 minutes. Pets will likely be sleepy or groggy for a few hours after this but will steadily become more alert. Within 12-24 hours most pets have fully recovered. This wake up period may be prolonged with longer anesthetic procedures, in geriatric pets, in sicker patients and in neonates (patients < 2 months of age).

Many patients may not have a bowel movement for 24-36 hours after anesthesia. This is a normal response to fasting prior to anesthesia and small meals after anesthesia. Once your pet is eating and drinking normally again, normal bowel movements should occur.

Key things to remember

- Ensure your pet is fasted as directed by your veterinarian prior to every procedure
- Make sure you discuss your pet's medical history, including any allergies, and any medications they are currently taking with your veterinarian.
- Every pet that has an anesthetic procedure performed will have a record of it within their medical record. If you know your pet has had a previous allergy or sensitivity to a medication but you cannot remember the name of the medication, you should bring this fact to your veterinarian's attention.
- Talk to your veterinarian about having pre-anesthetic blood work performed to help them learn all information possible about your pet prior to anesthesia. This will increase safety and help guide the anesthetic process and decisions they make regarding the anesthetic drugs they use and pre- and post-operative treatment.
- If you have concerns or questions about the anesthetic process or the surgical/dental procedure please ask. We are happy to explain as much as we can about them. Your pet's safety and health are our top priority.

The pre-operative work up

WHAT DO WE RECOMMEND AND WHAT DO THE TESTS TELL US?

Blood chemistry panel

This panel helps assess overall health by assessing the major organ systems of the body.

Complete blood count (CBC)

This test evaluates the 3 main types of blood cells that pets have in their bloodstream. These include red blood cells, white blood cells and platelets (cells that are responsible for blood clotting). The CBC tells us whether infection, inflammation or anemia is present. A blood sample is taken with a small needle to run blood tests.

Urinalysis

Analyzing urine gives veterinarians information on their patient's kidney function and hydration status.

Monitoring blood pressure

Blood pressure

Blood pressure measurements are taken on veterinary patients in the same manner as it is taken with human patients - with a blood pressure cuff and a small machine. Anesthetic drugs can cause a decrease in blood pressure; as such, it is important to assess a patient's blood pressure before, during and after an anesthetic procedure. It is also important to detect high blood pressure in patients prior to anesthesia as this could affect a technicians interpretation of this value while their patient is under anesthesia.

Chest "x-rays"

Chest x-rays are recommended pre-anesthetically in geriatric pets and in patients where there is concern for compromised function of either the heart or lungs. These x-rays give information on the size of the heart, the size of blood vessels and the appearance of the lung field.

WHY IS THIS IMPORTANT PRE-ANESTHETICALLY IN PETS?

Knowing these values increases the safety of anesthesia by giving us more information to make key decisions for your pet.

If any of the values on these tests are out of a normal range we may elect to delay anesthesia to focus on correcting the underlying conditions that resulted in these values prior to the procedure.

These values are very helpful in making the best choice of anesthetic drugs and in choosing the most appropriate IV fluid rate for your pet.

Pain control

Just as with people, pain can accompany a pet's illness, injury or surgical procedure. Pain is considered to be the "5th vital sign" in veterinary medicine and effective pain management is a key part of caring for your pet and assuring their comfort.

Patients are given a combination of injectable and oral pain medications to control different types and degrees of pain. Sometimes patients are sent home with multiple pain medications to treat different kinds of pain. It is important to follow your veterinarian's instructions to ensure that your pet receives this medication. If your pet seems nauseous or is not eating, it is important to call your veterinarian.

CATS AND DOGS EXPRESS PAIN IN A VARIETY OF WAYS WHICH MAY INCLUDE:

- Vocalizing-whimpering/yelping in dogs; yowling in cats
- Sleeplessness
- Trembling
- Inappetance
- Restlessness or standing /sitting in unusual positions
- Reluctance to move or walking with a stiff gait
- Flattened ears or “clamped tail”
- Nausea, hypersalivation
- Lameness or any gait abnormality
- Inappropriate elimination (urine, feces)
- Depression

Fluid therapy

An important part of anesthetic safety involves support of the cardiovascular system with IV fluid therapy throughout the procedure. Anesthetic inhalant gases cause blood vessels to dilate which can cause a decrease in blood pressure. Fluids are given intravenously to balance these changes. The dose and type of fluid given is based on the needs of your pet as well as their medical history. If your pet has a history of cardiovascular disease, IV fluids are given at lower doses. Pediatric patients often require higher fluid doses, while geriatric patients may require lower doses.

Post-anesthesia recovery and home care

MONITORING

Once your pet has returned home with you it is important to monitor them for potential post-anesthetic effects for the following 48 hours. It is not unusual for a pet to have little interest in food or water for the first evening after anesthesia. Most pets should return to normal appetite and thirst by the following morning. Your veterinarian will send home any special feeding instructions. If your pet is interested in food the evening after an anesthetic procedure a good general rule to follow is to decrease the size of their normal meal by 50% for the first evening.

SIGNS TO WATCH FOR

It is important to notify the hospital if you observe any of the following signs in your pet after anesthesia:

- Vomiting, regurgitation or retching
- Persistent diarrhea or blood in the stool
- Coughing or any difficulty breathing. Some pets might have a slight cough from irritation from the soft plastic tube that was in their airway during anesthesia. If this cough becomes more frequent or persists longer than 24 hours your pet should be rechecked.
- Pale gum color, lethargy

MEDICATIONS

You may be sent home with pain or anti-nausea medication - or other medications for your pet's specific medical condition. Please follow directions closely and call the clinic if you have any questions about how to administer these medications or possible side effects. Pain medications and antibiotics can cause nausea in some pets. Please call if you have any concerns or questions about continuing a medication.

PAIN CONTROL

Effective pain management is a very important part of caring for your pet and helping them recover post-operatively. See earlier section on page 17 for ways that cats and dogs may express signs of pain. It is important to contact your veterinarian if you are concerned that your pet continues to be painful after a procedure while being treated with a pain medication at home.

ACTIVITY RESTRICTION

Your pet has undergone an anesthetic procedure. It is important to keep them quiet and restrict their exercise for the first 48 hours after anesthesia. Your veterinarian will give you instructions on specific activity restriction needs for your pet. Restricting activity post-surgery is crucial to ensure the success of your pet's surgical procedure and to allow healing from injury. While restricting their exercise, your pet should not engage in the following activities:

- Running
- Jumping (including up/down furniture or in/out of vehicles)
- Bathing/swimming
- Running up/down stairs
- Excessive horseplay with you or other pets

INCISION CARE

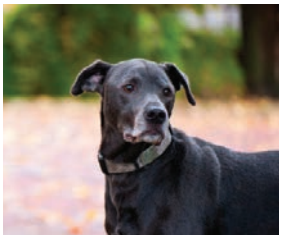
If your pet has a surgical incision it is important to check this incision at least twice a day for the following 14 days, or until your veterinarian has removed all sutures. Not all surgical incisions have external sutures. You will be informed by your veterinarian if your pet needs to return for suture removal. When checking the skin each day, it should either appear unchanged or more like normal skin that the day prior. Please call the hospital if you notice increased redness, swelling, discharge, loss of sutures/opening on incision, pain at the incision site or if the area around the incision feels warm to touch.

POST-SURGICAL/MEDICAL PROGRESS EXAM

If your pet has had surgery or dentistry performed your veterinarian may recommend a medical progress exam to recheck your pet's surgical incision or dental extraction site(s) within one week of the procedure.

Specific breed/age group concerns

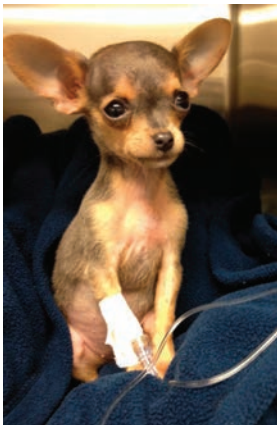
Although there are no true breed related anesthesia sensitivities, there are some age, body-size and breed related concerns that are important to be aware of.



GERIATRIC PATIENTS

Large dogs >7 years of age.
Small dogs > 12 years of age.
Cats > 14 years of age.

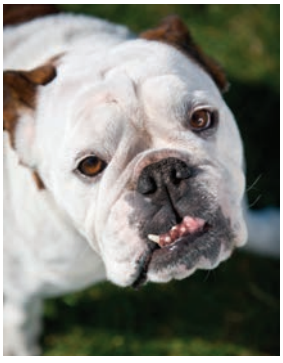
Just like people, as animals age organ function often decreases thus leading to an increased sensitivity to anesthetic drugs. This means that geriatric patients require lower doses of anesthetic drugs.



NEONATAL PATIENTS

(< 2 months of age)

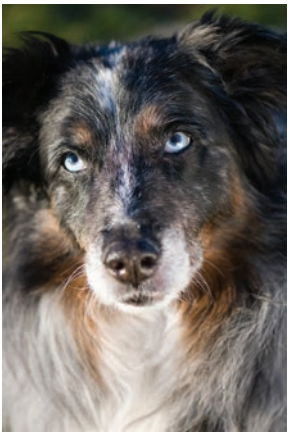
Younger patients do not have fully mature cardiovascular systems (heart/lungs) and often require higher IV fluid rates and lower doses of anesthetic drugs.



BRACHYCEPHALIC BREEDS

(ie. French bulldogs, English bulldogs, Pugs)

The physical changes in the snout and upper airway of these breeds can lead to an airway that is narrower than other breeds. This can lead to difficulty when they take a breath in (inspire). It is important to wake these breeds up slowly from anesthesia and to keep the plastic tube (called an endotracheal tube, or ET tube) in their airway while they are waking from anesthesia. These breeds can also be prone to regurgitation so it is essential to ensure that they are fasted prior to anesthesia. Many of these breeds are given medications prior to anesthesia to help decrease nausea.



COLLIES/AUSTRALIAN SHEPHERDS

Approximately 60 % of these breeds have a mutation in the ABCB1 gene which encodes P- glycoprotein, a protein that is important in the transport of certain drugs. This makes these breeds (if they have this mutation) very sensitive to certain drugs including Acepromazine and Ivermectin. It is important to talk to your veterinarian about this if your pet is a Collie or Aussie Shepherd (or a mix of these breeds) as you may be interested in getting your dog tested for this mutation.

DOBERMANS

A number of dogs within this breed have a hereditary deficit in an essential blood clotting factor called vonWillebrands (vWF) factor. The first time a Doberman has surgery preoperative blood work including a specific clotting test called a BMBT (buccal mucosal bleeding time) should be performed before the procedure. A dog with a vWF deficiency may have normal platelet numbers on a CBC but the function of those platelets could be abnormal. A Doberman with this clotting factor deficiency can still have surgery but they will likely need support with specialized blood products. vWF deficiency can happen in any dog, but more common breeds to see this besides Dobermans include Standard Poodles, Shetland Sheepdogs, Scottish Terriers, Golden Retrievers, and Corgi's.

SMALL SIZED DOGS

Due to their small body size, smaller dogs are prone to lower body temperatures under anesthesia. A very important focus with smaller dogs is keeping them warm under anesthesia. There are also drugs in concentrations specifically designed for smaller dogs.

GIANT BREED DOGS (Great Dane, Pyrenees)

Due to their large body size anesthetic drug doses must be carefully considered in giant breed dogs. Doses should always be based on the lean body weight of the patient and ideally on body surface area, not body weight. Most giant breed dogs require lower anesthetic doses than those typically calculated based on their full body weight. We carefully calculate the dose of drugs for each individual patient.

Cats

Cats typically handle anesthesia well. As cats are small in size a very important focus is on keeping them warm throughout anesthesia. This is accomplished with forced air warmers called 'bair huggers'.

A complete pre-anesthesia exam and workup is essential in cats, particularly as they age. Older cats are prone to heart disease and kidney disease and it is important to know this prior to anesthesia. Cats with heart disease and kidney disease can have very successful anesthetic procedures with proper adjustments made to medications and fluid therapy.

Special focus on Dentistry and anesthesia

WHAT IS PERIODONTAL ('GUM') DISEASE?

- It is an infection of the tissues and bones that surround and support the teeth.
- It is the most common clinical problem in adult cats and dogs.

WHAT CAN I DO FOR MY PET TO HELP PREVENT PERIODONTAL DISEASE?

- Have an annual veterinary dental cleaning performed. This includes a thorough oral and tooth exam, dental x-rays, a complete cleaning below the gum-line and professional scaling and polishing of the teeth.
- Daily home dental care including brushing and the use of dental treats.

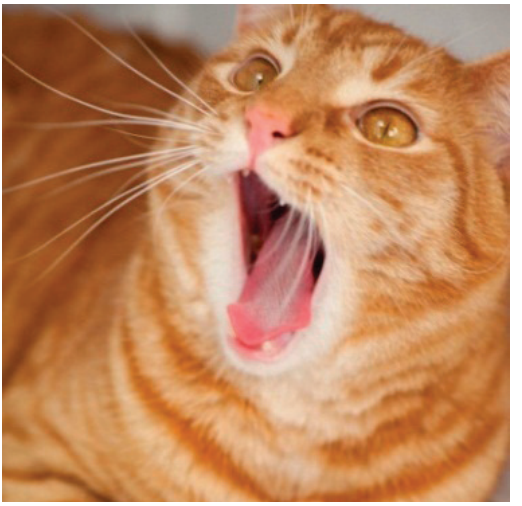
WHY DO SOME PLACES DO DENTAL PROCEDURES WITHOUT ANESTHESIA AND WHAT IS THE DIFFERENCE?

We do not support non-anesthetic dental procedures at VCA hospitals for the following reasons:

- An oral examination in an awake patient only allows veterinarians to see only 50% of the oral cavity - and only in the most cooperative of patients. Doctors are often able to see just the crowns of the teeth. The rest of the tooth (roots) is under the gum and in the bone – so this type of dental procedure will not help prevent periodontal disease.
- Cleaning (scaling) the crown of the tooth without cleaning under the gum is only cosmetic and will not promote dental health.
- In patients that have gum disease, deep cleaning of the gingival pockets

(the space between the tooth and the gum) is essential to help control the progression of the disease. Thorough cleaning can't be done in a cat or dog who is awake.

- A complete oral examination is done under anesthesia. Measuring pockets and taking x-rays indicate which treatment should be done while the patient remains anesthetized.
- 30% of periodontal disease (tooth and gum) is diagnosed with dental xrays. These x-rays cannot be performed in a patient who is awake.
- As previously discussed, when a patient is under anesthesia a soft plastic tube is inserted into their trachea to protect their airway. There is no protection of the airway during a non-anesthetic dental cleaning and the pet could accidentally inhale tartar, saliva or a loose tooth into their lungs.
- Non-anesthetic dental cleanings cause increased stress and anxiety to the pet and can also be painful.
- Dental procedures performed under anesthesia is the standard of care recommended by the American College of Veterinary Dentistry (see www.avdc.org/afd for excellent reference materials), the American College of Veterinary Anesthesia and Analgesia and by VCA Animal Hospitals. This allows a controlled, medically thorough and stress-free procedure for your pet.



WHY ARE DENTAL RADIOGRAPHS IMPORTANT?

- 50% of the tooth (the roots) is under the gum and in the bone which cannot be visualized and evaluated without dental x-rays. X-rays help identify problems that are under the gum-line.
- Dental radiographs are important because 30% of dental abnormalities are detected by taking and evaluating x-rays.

Dental x-rays from a cat

Figure 1 – Upper right jaw

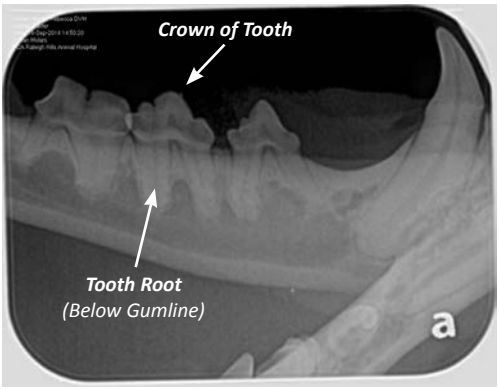


Figure 2 – Lower left jaw

IF MY PET IS OLDER AND NEEDS A DENTAL PROCEDURE DOES THAT CHANGE YOUR APPROACH TO ANESTHESIA?

- Older pets handle anesthesia very well as long as some important changes that occur with aging are taken into consideration when planning the anesthesia protocol.
- Important considerations in older pets include decreasing anesthetic drug doses, judicious use of IV fluids and careful monitoring throughout the three phases of anesthesia.
- Another common technique that can be used with geriatric patients is the use of local anesthetic nerve blocks to control pain locally and allow lower levels of other anesthetic drugs to be given.
- It is typical for older pets to take a little longer to recover from an anesthetic procedure.

IF MY PET HAS TEETH EXTRACTED DURING A DENTAL PROCEDURE HOW DO YOU TREAT THEM FOR PAIN?

- Pain associated with dental procedures is treated with anti-inflammatory pain medication as well as opioids when needed.
- Most dental procedures are also treated with local nerve blocks which help control pain.
- A diseased tooth often causes more pain than the procedure to remove it and a patient typically feels much better once these teeth are removed. Your pet will be treated for pain during the procedure and your veterinarian will send medication home with you to use to treat your pet for any post-extraction pain.

Tips for care of your pet after dental cleaning with extractions

- Please refer to your veterinarian's discharge instructions for medication doses and how frequently the medication can be given.

  It is best to feed soft food for at least three days after dental extractions. Recommended dietary options include feeding a soft (canned) version of your pet's regular food and/or soaking dry kibble in warm water prior to feeding. You may notice a small amount of blood or blood-tinged saliva in your pet's water or food bowl after eating or drinking. This is a normal occurrence after having teeth extracted (removed) as the gums will be inflamed and should resolve within 24 hours.

- Your pet should be fed 50% of the usual amount of food they receive for their first meal after anesthesia. Anesthesia and pain medications can both cause nausea; slowly introducing your pet's diet back to their usual amount of food helps decrease the potential for nausea.

Please don't hesitate to ask your veterinarian if you have any questions or concerns about surgery, dentistry or anesthesia. VCA veterinarians are here to answer questions and to focus on ensuring the safest procedure possible. Your pet's health, comfort and safety is our top priority.

References are available upon request.

Notes:

VCA Animal Hospitals
vcahospitals.com