INHALATION ANESTHESIA

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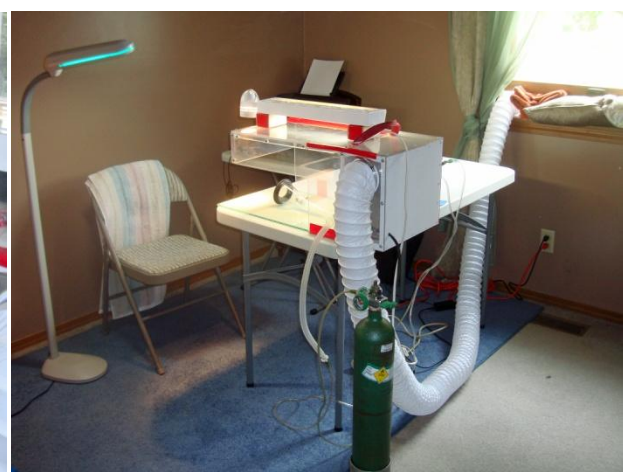
Amazon parrot being sedated with inhalation anesthesia

I use inhalation anesthesia for routine examination and grooming procedures on pet birds. This treatment technique has been developed over decades of avian practice and is time-tested, safe, cost-effective, and overwhelmingly accepted by almost all of my clients.

The main reason to use inhalation anesthesia is to alleviate stress to the bird, the veterinarian, and his assistant. Macaws and large cockatoos, in particular, may scream continuously. Restraining them with a towel, trying to avoid being bitten, and attempting to do a thorough physical exam and grooming can be challenging. Sedation allow the bird to be calm and still. A veterinarian's assistant is not necessarily required. Often the owner can sit with the bird, observe what is being done, and help as needed.



Anesthesia is performed with the bird's head and body placed under a plastic hood that has a built in exhaust fan in the back. Waste anesthetic gas is forced through this fan into a length of four inch vinyl dryer hose and evacuated to the outside of the room, either via a window, door, or other appropriate exit. This prevents anesthetic exposure to any people in the room where I am working.

The anesthetic agent I use is isoflurane. It is mixed with oxygen and delivered to the bird through a facemask.

Oxygen moves through appropriate tubing from an oxygen source to a precision vaporizer (pictured above on right) where isoflurane is added to the gas.   The vaporizer is basically a heavy, metal chamber.

Oxygen is referred to as a gas.   An anesthetic agent, such as isoflurane, in a gaseous state, is called a vapor.   When you purchase isoflurane, it comes as a liquid.   It is added to the vaporizer chamber through a portal on the lower right side. The round window on the left side of the chamber indicates how much liquid isoflurane is inside

the chamber. Isoflurane is quite volatile at room temperature, and as such, vapor fills the chamber.

Oxygen enters the inlet of the vaporizer (top left) and is divided into two flow pathways. A control dial (at the top of the chamber) adjusts a 'splitting valve' which regulates how much gas goes into each of the two pathways. One pathway is a by-pass and does not come into contact with any anesthetic vapor. Through the other pathway, gas is sent into the vaporized chamber and becomes fully saturated with vapor.

When selecting for the highest concentration of isoflurane (5%) most of the oxygen is directed into the vaporizing chamber. When selecting for the lowest concentration (1%) only a small amount of oxygen is directed into the chamber.

At the exit end of the vaporizer, gas from the two pathways mixes together (upper right). The final concentration depends upon how much oxygen went through each of the two pathways. The percent of anesthetic in the final mixture is accurately determined by the setting of the dial control, thus the term "precision vaporizer" is used.

For many years I utilized steel or aluminum oxygen tanks as my source for this gas. However in the last year, I switched to an oxygen concentrator (pictured below). The main reason was to save money. However safety was another concern. I would often carry multiple tanks in my car when I was on a long road trip. There was always the concern that if I was involved in an auto accident, in which there was a fire, and if a tank was punctured or the pressure release valve was opened, then the oxygen could act as an accelerant. Tanks not secured properly could also become airborne projectiles and cause serious injury. Lastly there was always the hassle of constantly having to find a facility, like Airgas, where I could swap out empty tanks for full ones.

How does an oxygen concentrator work?

This portable machine weighs 32 pounds and is easily transported in my car. It has been maintenance free for over a year. I change air intake filters every 6 months. To turn it on, you just plug it in.

Ambient air is roughly 21% oxygen, 78% nitrogen, and 1% other gases. A concentrator removes the nitrogen from this air, resulting in a final concentration of about 93% oxygen.

Room air is drawn into the machine through a filter on the back of the unit. A compressor sends the filtered air to a solenoid valve which moves it into one of two pressurized cylinders. Each cylinder contains

molecular sieve beds which are composed of zeolite, a micro porous aluminosilcate mineral. This material has the ability to absorb and trap most of the nitrogen in the air. The remaining oxygen-rich air is pushed out of the cylinder, through another exit, and directed toward a flow meter.

Once the sieve beds in the first cylinder are fully saturated with nitrogen, the solenoid valve is triggered, and now the incoming air is switched to the second cylinder. While this sieve bed is becoming saturated with nitrogen and the oxygen-rich air is being forced toward the flow meter , the nitrogen that was captured in the first cylinder is being vented out. This design ensures a constant flow of oxygen-enriched gas.

FOR MOST OF THE PROCEDURES I PERFORM, ANESTHESIA IS EITHER REQUIRED OR RECOMMENDED

1. **New clients will be asked to read and sign a consent form regarding the use of isoflurane for the treatments to be performed and the risks involved. They will be given the opportunity to decline anesthesia for certain procedures if they wish (see Protocol #2).**

2. **My clinics are designated for 'clinically healthy birds' only. All of the treatments I perform are elective procedures. Owners with birds that they perceive to be sick are encouraged to take them to a local avian veterinarian. Nonetheless, I always rely on any history the owner may give be before proceeding.**

3. **I observe the bird in its cage or carrier or while being held by the owner. I'm looking at the bird's general posture, physical condition, and respirations.**

4. **I observe the bird after being caught and physically restrained with a towel. I am looking at how the bird is breathing. Are the respirations**

rapid, labored, open-mouthed or raspy? Are there any signs of upper respiratory disease? Is there poor color to the facial skin or mucus membranes of the mouth? Does the bird's voice sound normal?

5. I feel the crop, breast musculature, and abdominal region for any abnormalities.

6. I always have a stethoscope available to monitor the bird's heart before and during treatments.

7. If I perceive everything is normal, then I will mask the bird down with isoflurane and start a more thorough examination and whatever treatments the owner requests.

8. If I see anything out of the ordinary I will not proceed with the use of inhalation anesthesia. I will do the requested treatments with manual restraint or discontinue them altogether. Recommendations and or referral to a local avian veterinarian may be indicated.

Flow Meter on Oxygen Concentrator

9. All birds are induced at a concentration of 4-5% isoflurane and an oxygen flow rate of approximately 4 liters/minute, regardless of the size of the bird. (see picture above). Once the bird is relaxed, the concentration of isoflurane is reduced to between 2-3% for the duration. The level of anesthesia is monitored by skin color, response to pain, depth and rate of respirations, and auscultation with a stethoscope. Anesthesia time for pet birds is usually less than 8 minutes, even in the largest species. Anesthesia time for breeder birds that are only being surgically sexed is usually less than 3 minutes.

10. Afterwards an assistant will usually hold the bird in a towel until it starts to arouse. At this point the bird is returned to its cage or carrier where it is monitored over the next 10-15 minutes until fully recovered.

Anesthetized birds recover in their carriers for 10-15 minutes before being returned to their regular cages or allowed to leave the clinic.