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Clinical Aspects of Primate Medicine

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Introduction

Despite the fact that importation of non-human primates for the pet trade was banned in 1976, many people continue to keep them as pets. Although the number of such pets has steadily declined, there are several reasons why clients should continue to be discouraged from owning primates as pets. Non-human primates have a high potential to be carriers of zoonotic diseases including hepatitis, tuberculosis, shigellosis, salmonellosis and Herpes B virus. They are also virtually impossible to toilet train. Additionally, many species are hard to handle, are destructive to property, and have a tendency to bite.¹ Since there will always be a percentage of people who insist on having these exotic pets, the practitioner interested in exotics should be prepared to handle primates as patients. Both the proper equipment and adequate knowledge of their care are necessary. Unprepared and inexperienced clinicians could sustain severe bodily injury or contact zoonotic diseases if not versed in the handling of primates.

Pet primates fall into two basic categories: Old World primates from Asia and Africa, and New World primates from South and Central America. New World monkeys are the most common pet monkeys in veterinary practice. They are distinguishable from the Old World primates by a prehensile tail (although not all New World monkeys have a prehensile tail) and imperfectly opposable thumbs. They also tend to have flattened noses and faces with widely spaced nares. Their size ranges from the 150 g marmosets to the 12 kg woolly monkey. Other examples of pet New World monkeys include the squirrel and spider monkeys and capuchin.²

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Old World primates, on the other hand, have a more dog-like, narrow nose with the nares set closer together. They also have thick pads over their ischial tuberosities, exhibit menstrual bleeding, and often, cheek pouches.³ Old World primates also exhibit one less premolar in both the upper and lower arcades than the New World monkeys (2 instead of 3).⁴ Examples of pet Old World primates include the macaques, rhesus, African green and patas monkeys, as well as chimpanzees, baboons and orangutans.

When instructing the client as to cage specifications for a primate the size of the animal is of obvious importance. The cage should be at least 2.5 times the height and 5 times the width of the primate with arms extended.⁵ The use of key or combination padlocks is essential since their manual dexterity allows primates to escape from most conventional cages. The environmental temperature should be maintained at 65°-80°F with a relative humidity of 55-70%.⁵

The difference between males and females is obvious except in spider monkeys. The female of this species has a 5 cm appendage on its vulva with a 1 cm opening on the distal portion.⁴ This structure resembles a penis and many owners are surprised to find out that their supposed male is actually a female.

Primate owners should not be accepted as clients unless the practitioner is well equipped, knowledgeable and experienced in the use of the equipment and has a trained assistant. Necessary equipment for practicing primate medicine includes the following items:⁶

1) Monkey Handling Gloves^a or Primate Gloves^b.

A pair of heavy leather gloves preferably with double cuffs.

^aSimmons Glove Co., Oakland, CA

^bPrimate Imports Inc., Box 416, Port Washington, NY 11050

^cAbdco Wire and Metal, Hayward, CA

- 2) A strong net with at least a 4 foot pole and a 2 foot diameter hoop.
- 3) A pole with an attached noose. This should be at least a 6 foot pole.
- 4) Self closing doors in the exam rooms with all equipment in the room under cover.
- 5) Properly constructed, escape-proof cages with double locking doors and excrement pans that lock in the cage.
- 6) Chemical restrainer: ketamine hydrochloride.
- 7) For primates over 5 kg - a squeeze cage.

Restraint

Hand catching with gloves is the preferred method to catch primates. The client should be instructed to bring in primates in a cage or carrier to facilitate easy handling. It is best to obtain the complaint and complete history from the owner before the patient is brought into the clinic. This minimizes the time that the primate has to adjust to its new surroundings, thereby making capture and restraint easier. Clients can also be instructed to administer a tranquilizer concealed in the animal's food prior to a veterinary hospital visit in order to better control extremely fractious animals.

Small primates should be examined with minimal restraint. A heavy towel or a pair of leather welder's gloves should be sufficient. Larger primates require the use of primate gloves developed specifically for such use. If an animal is too large to handle safely (i.e. greater than 5 kg) or if it cannot be examined easily with manual restraint, it should be tranquilized. Ketamine hydrochloride is the agent of choice for such use. It should always be remembered that primates are 4-10 times stronger than people on a pound to pound basis.⁴ Two people cannot adequately restrain an uncooperative full grown chimpanzee.

When handling a primate it is always best to grasp it by the upper arm and not the forearm. This avoids accidental fractures due to struggling. The elbows should be brought together behind the patient's back. Using one hand, both arms are then grasped above the elbow and pressed together. With the assistant's other hand both legs are grabbed and the animal is stretched out onto the exam table.⁶ The clinician can then examine the animal while the assistant continues to hold it.

Physical Exam

A primate's body weight is best measured by weighing the animal in the cage and then reweigh-

ing the cage. The physical exam should begin by noting the skin coat and general body condition. The head and mouth should be examined thoroughly. The clinician should look for oral ulcers (especially in macaques) indicative of Monkey B virus (Herpes) which can be fatal if transmitted to man.⁶ Extreme caution should be exercised with animals showing such lesions. Dental caries are common if animals are fed sweets and table food.³ The chest and abdomen should be thoroughly auscultated, percussed, and palpated. Feces should be collected for parasite and bacterial examination. This usually involves little work since most primates under stress of physical restraint will supply the clinician with an ample amount of feces. A tuberculosis skin test should be conducted as part of any routine primate physical. This should be done on a regular basis at least once a year.⁶

Blood should be drawn for routine blood tests especially in ill patients. Clients should be encouraged to allow an initial blood work-up on their healthy primate so that comparative normal data will be available if the animal becomes ill. Preferred sites for venipuncture vary. The femoral vein is easily accessible in the unanesthetized animal. It is unwise to clip toenails in order to collect blood as this is very painful to the animal. The cephalic veins are generally too difficult to work with due to heavy forearm musculature and comparatively small vessels. In the anesthetized patient the lateral cephalic and saphenous veins can be utilized for small amounts of blood in smaller primates.²

Normal rectal temperatures of primates range from 37.2°C to 40.2°C and average 38.8°C (101.8°F). Excitement and restraint can falsely elevate these values. The normal primate heart rates and respiratory rates depend largely on the size of the species being examined. Smaller primates have heart rates between 165-240 beats per minute while larger animals show rates of 95-112 per minute. Similarly, smaller primates have normal respiratory rates of 20-50 breaths per minute while larger species range from 12-20 per minute.⁵

Radiology can be of some assistance when attempting to diagnose primate illnesses. In general, it is necessary to sedate or anesthetize the patient to allow adequate positioning and to minimize the risk of injury to the staff. All thoracic films should be taken with a horizontal beam with the patient propped up in a sitting position. This avoids cranial displacement of the abdominal organs and diaphragm which is seen in the ventrally recumbent position.⁷ A frame can be constructed to hold the animal in this upright position. The head should

⁴Abdco Wire and Metal, Hayward, CA

be held upward with a radiolucent wedge to avoid superimposition with the upper thorax.

If general anesthesia is required, intubation is advisable. The larynx must be sprayed with the local anesthetic to avoid laryngospasm. It is easiest to intubate the animal lying on its back. Smaller species are very difficult to intubate so a mask technique is preferable.⁸ Halothane has been used successfully. Thiopentone sodium (2.5%) IV is the most useful of the injectable anesthetics. Doses are the same as those for dogs or cats.⁸ It is important to remember to place the animal in a locked recovery cage to prevent escape.

Nutritional Diseases

Many of the common diseases and conditions seen clinically in primates are due to improper nutrition. These problems are usually the result of owner ignorance of dietary needs. Many infections are associated with dietary deficiencies of protein, folic acid, vitamin C, and in New World monkeys, vitamin D₃. The best foods available are the commercially prepared, nutritionally balanced diets. Animals fed high levels of fruits and vegetables commonly develop protein deficiencies.³ The proper primate diet should consist of 25% protein for New World primates and 15% for Old World primates. This is based on the fact that New World primates in general eat more insects than Old World species. The fat content of the diet should be 3-5%. This amount is adequate if essential fatty acids are present at sufficient levels. Too much fat can lead to diarrhea and improper absorption of other nutrients.⁴ All primate diets should be vitamin supplemented. An average adult monkey will eat 3-5% of its body weight of monkey biscuits per day.⁴ A minimum of 2 feedings per day and ideally 3 per day should be employed to reduce wastage. Biscuits can be soaked in milk to entice finicky eaters to convert to a biscuit diet.

Inadequate caloric intake can lead to caloric exhaustion, chronic catabolism and hypoglycemia. This should be considered as a major differential when presented with a comatose monkey. The diagnosis of caloric exhaustion is relatively easy and is based on dietary history, low blood glucose, ketonuria, emaciated body condition, and a depressed attitude.⁵ If severely depressed or comatose the patient should have an IV catheter placed in the lateral saphenous vein. IV dextrose and lactated ringers solution should be administered for shock. IV prednisolone (3-5 mg/kg) can be given. Blood should be drawn to check blood glucose levels (normal is 60-110 mg/dl). The patient's hands should be wrapped and a restraining collar placed

around the neck to prevent removal of the IV set.² Treatment and prevention of caloric exhaustion should also include an increase in dietary calories through mixed bird seed, molasses, hard-boiled eggs, whole wheat bread and commercial primate diets. It is good practice to administer parenteral thiamine and other B-complex vitamins to ensure the utilization of consumed calories.⁵

Vitamin C deficiency presents clinically as an animal with a poor haircoat, hemorrhage of the gums and gingivitis, swelling of epiphyses of long bones and general debilitation.² Treatment includes oral vitamin C (15-25 mg/kg) daily until the typical signs of scurvy disappear. Ascorbic acid can be given initially via IM injection at 7-10 mg/kg. Primates require 1-4 mg/kg maintenance level of vitamin C. Most commercial diets have adequate amounts but after storage for 90 days these levels decrease markedly.³

Calcium/vitamin D₃ deficiency is another nutritional problem often encountered in pet primates. Animals most commonly present with acute lameness. Severe deficiency can lead to rickets, osteomalacia and osteodystrophy of the mandible with loss of teeth.² A physical exam reveals the development of soft bones, deformities of long bones, multiple pathologic fractures and an increased serum alkaline phosphatase. Radiographs show extensive skeletal demineralization with varying degrees of scoliosis, kyphosis and folding fractures. Immediate treatment consists of vitamin D₃ at a dose of 2000 IU/kg IM daily.³ This reverses the process but bone deformities will remain. Ultimately, the diet must be corrected and supplemented with oral calcium and vitamin D₃. Calcium carbonate is a better source of calcium than bone meal due to the excess phosphorus in the latter. New World monkeys require vitamin D₃ (animal source) in their diet since they are unable to utilize vitamin D₂.²

Bloat or gastric dilatation is another nutritionally related syndrome seen occasionally in primates. The condition occurs when large quantities of monkey biscuits or other water absorbent foods are consumed followed by excessive fluid volumes. It is usually seen in greedy animals or animals in which restricted feeding periods precede resumption of full feedings. Occurring primarily in macaques, the exact etiology of bloat is unknown. Recently, there is evidence that *Clostridium perfringens* may be involved.¹ The organism is usually isolated from colonic contents of animals dying from bloat, however the condition has not been experimentally produced upon administration of the organism. Animals present depressed or comatose with shal-

low, rapid respiration, cyanotic mucus membranes and a distended abdomen. Treatment involves passing a stomach tube to relieve pressure, gastric lavage with warm Lactated Ringers solution, and IV prednisolone and fluids for shock.² Prevention should include multiple feedings of small quantities of food and full access to water. Additionally, the feeding of bloat-causing vegetables such as onions and white cabbage should be avoided. Fruits containing excessive amounts of sugar such as bananas, dates, grapes and figs which promote dangerous fermentation in the stomach should also be avoided.⁹

Bacterial Diseases

Salmonella and *Shigella* have a high incidence rate in New World primate enteritis cases. Because of the great potential for zoonotic transmission they warrant discussion. Clinical signs in monkeys vary with the age of the animal (more severe in the young) and virulence of the strain. Many animals show no signs until stressed and often remain carriers. Mild cases develop partial anorexia and soft, semi-fluid feces gradually over 24-48 hours. If severe and acute, anorexia, refusal to drink, depression, tenesmus, fluid or hemorrhagic diarrhea, fever, vomiting and prostration may be present. Rapid dehydration often leads to death if not treated. Tenesmus may also result in rectal prolapse.¹⁰

Laboratory data demonstrate an increased total white blood cell count with a marked left shift. Toxic band neutrophils predominate. Increased fibrinogen supports an inflammatory condition. Leukocytes in the stools (Methylene Blue stained fecal smear) due to bowel inflammation separate *Salmonella* and *Shigella* from agents not causing bowel inflammation (*Vibrio*, *Staph. aureus*, *Clostridium* or viral etiologies). Fever, leukocytosis, or blood in the stools indicate a need for immediate antibiotic treatment. Severe cases should be started on broad spectrum antibiotics pending results of a fecal culture. Antibiotics should not be used in mild cases because they are ineffective and prolong a carrier state. Chloramphenicol (50-100 mg/kg QID oral or IM) or Ampicillin (200 mg/kg TID oral or SQ) are the drugs of choice.¹⁰ Treatment should continue for 5-7 days. Vigorous fluid therapy and continued caloric intake are essential. The prognosis is good if treatment is immediate and supportive therapy is adequate. It is important to remember that leukocytosis alone in primates should not be considered a sign of infection unless accompanied by toxic granulation, Dohle bodies, and a high percentage of band neutrophils. High leukocyte counts in peripheral blood have occasion-

ally been noted in healthy primates and could be misleading if incorrectly interpreted.¹¹

Primate owners should be aware of the extreme susceptibility of their pets to tuberculosis. Although Old World primates are more susceptible, all simians should be tested. Old Tuberculin, (0.1 ml) (Tine Test^R — American Cynamid or Mantoux test^R — Cooper Animal Health) should be administered intradermally. The preferred site of injection in primates is the eyelid, however, the ventral forearm and chest have also been used. The test should be read at 48 and 72 hours. Any reaction is considered positive and should be investigated.² Positive animals should be destroyed, not treated. All primate owners should themselves have a tuberculin skin test and chest radiographs annually as the disease is highly zoonotic.

The etiology of tuberculosis in primates is usually *Mycobacterium tuberculosis* (acquired from humans), although they are also susceptible to *M. bovis* and *M. avium*.³ Ninety percent of all U.S. cases occur in rhesus monkeys. Clinical signs are not striking until the advanced stages of disease. The first signs are often behavioral changes. Animals may become slower than usual or refuse to climb. Later in the disease process, the animal takes on a dull appearance, crouches in corners and demonstrates anorexia, exhaustion upon exertion and lethargy. Sudden death is common. Less common signs include diarrhea, skin ulcerations, suppurative lymph nodes and an enlarged spleen and liver.³ Differential diagnoses should include lung mites, pulmonary nocardiosis, pseudotuberculosis, systemic mycoses and neoplasia.¹

Viral Diseases

Several diseases of viral etiology are seen in non-human primates. Herpes simplex in man can be transmitted to primates causing acute depression and death. Strict hygiene is essential. Measles and Pox are also seen in primates. A vaccine is available for measles (attenuated live-Merck, Sharp and Dohme), however, the measles virus can be immunosuppressive and result in false negative tuberculin reactions.² Influenza is common in non-human primates. A careful history may show that the owner or handler was recently ill with similar signs.

Rabies in primates has been repeatedly documented. Over one thousand human cases worldwide have been directly related to monkey bites. Human vaccines are non-protective in non-human primates and attenuated animal vaccines have occasionally resulted in disease in primates. Despite unknown efficacy, killed products are safe.

It is therefore recommended that all non-human primates kept as pets be vaccinated with a killed product. Infection in primates is often the result of dog bites; the paralytic form of the disease predominates.¹²

Infectious Hepatitis occurs in monkeys and can be transmitted to man through feces. Sharp objects contaminated with blood or other body fluids can also transmit the disease.² Proper hygienic procedure is the best method of protection. Clinicians seeing numerous primates might consider being vaccinated for Infectious Hepatitis as a precaution.¹²

Herpes virus simiae (Herpes B) is by far the most feared of all monkey viral diseases because it is frequently fatal to humans. Eighteen of the 24 cases documented in humans since 1934 have resulted in death.¹² Transmission to man is through bite wounds, scratches and improper handling of contaminated tissues. Clinical signs in man include ascending myelitis and encephalitis with varying degrees of nausea, sore throat and cough. The disease is usually found in macaques and the history in a human case would probably include exposure to a macaque. A rising Herpes B titer and virus isolation can also be used to diagnose the condition in humans. The incubation period in man is 10-21 days.¹²

Monkeys with Herpes are usually asymptomatic. Ulcers on the tongue, lips, face or mucocutaneous junctions (similar to human herpes cold sores) may be present upon examination. The ulcers heal rapidly and are completely resolved within 14 days. A slight nasal discharge and mild conjunctivitis may also be present.¹² Primates with such ulcers, especially macaques, should be quarantined until the results of scrapings from ulcer margins for virus isolation are completed. If the culture is positive, the animal should be euthanatized. Due to the increased incidence of this disease in macaques and their aggressive behavior, clients should be discouraged from having them as pets.

Parasitic and Mycotic Diseases

Primates are susceptible to many external parasites including *Psorergates*, *Sarcoptes*, and *Demodex* mites and *Pedicinus* sp. lice. Treatment is with organophosphates and/or pyrethrins. The dermatophytes *Trichophyton* and *Microsporum* cause classic ringworm lesions in primates. Treatment for dermatophytosis is griseofulvin. Monkeys are also infected with the deep mycoses, *Nocardia*, *Candida*, *Aspergillus*, *Coccidioides* and *Cryptococcus*.⁴

There are many internal parasites of primates but only those seen with regularity will be discussed. *Strongyloides* spp. are very common. Clinicians

should suspect this parasite in an animal presented with chronic diarrhea, a dull haircoat and weight loss. The diarrhea can be watery or bloody. Thiabendazole is the treatment of choice.² *Dipetalonema* is very common in the peritoneal cavity of New World monkeys. The organism can cause pleural adhesions but few pathologic effects.³ *Microfilaria* can be seen in a routine blood smear.

Pulmonary acariasis due to *Pneumonyssus simicola* is very common in imported Old World primates, especially macaques. These lung mites are transmitted through ingestion related to the grooming habits of primates. The condition is often subclinical, however when clinical signs are present they are usually coughing and sneezing. The treatment is difficult and seems only to reduce the parasite load.¹³ The mites usually do not produce serious disease. Lesions include dilation and focal, chronic inflammation of terminal bronchioles.¹⁴ Although of low pathogenicity themselves, the real threat is bacterial infection secondary to irritation caused by the mites.⁹

Oesophagostomum spp., or nodular worms, are the most common nematode affecting Old World primates. They are present in the feces of over 50% of all newly imported Old World primates. On fecal flotation the eggs appear much like those of canine hookworms. Heavy infestations may cause diarrhea and adhesions which may prove fatal, especially in younger animals. The treatment of choice is thiabendazole (100 mg/kg repeated in 2 weeks).³ The best means of prevention of all internal parasites is good sanitation and adequate vector control.

Dentistry

Often a client will request that something be done about their monkey's sharp teeth. Removing or blunting of the canine teeth for safety sake is a common procedure in primate medicine. Removal of the canine teeth can be disfiguring and difficult. The roots of these teeth are very long and fracture of the tooth or alveolar bone is common if the clinician is not careful. The teeth must be adequately elevated before removal and dental flap techniques should be used as for dogs²

The best way to eliminate sharp teeth is by use of the blunting procedure. The canines are cut at a point level with incisors. The pulp is removed and the cavity is then filled with amalgam. Fillings often fall out and must be replaced.² Periodic dentals are recommended using a scaler to remove dental deposits. Abscesses of the upper canine teeth are fairly common in squirrel monkeys. These are easily treated by extraction of the tooth and lavage with an antibiotic solution.¹

Conclusion

The coming years will undoubtedly see a decline in the need for clinicians skilled in pet primate medicine. Still, the need to serve existing clients with primate pets is open for veterinarians possessing the proper knowledge and interest. Additionally, a need will always exist for veterinarians to assist at primate research and breeding facilities. It is hoped that the material contained within this paper will serve as a basis of information for clinicians interested in practicing primate medicine. Many publications are available for those readers seeking further information.

REFERENCES

1. Holmes, Donald D: *Clinical Laboratory Animal Medicine: An Introduction*. Iowa State Univ. Press, Ames, Iowa: 1984; 67-81.
2. Parrott, Theresa Y: An Introduction to Diseases of Nonhuman Primates. *Comp. on Cont. Ed. for the Prac. Vet.* 1986; 10: 733-738.
3. Whitney, RA: Primate Medicine and Husbandry. *Symposium on Non-domestic Veterinary Medicine*. Veterinary Clinics of N.A., 1979, 3: 429-445.
4. Johnson, David K: *A Guide to Diagnosis, Treatment and Husbandry of Nonhuman Primates*. Vet. Med. Pub. Co., 1981.
5. Wallach, Joel D. Boever, William J: *Diseases of Exotic Animals: Medical and Surgical Management*. Saunders, 1983; 3-134.
6. Harris, James M: Restraint and Physical Examination of Monkeys and Primates. In: Kirk, Robert W, ed. *Current Veterinary Therapy*. 6th ed. Saunders, 1977; 721-723.
7. Porter, Francis J: Radiology of Exotic Species. In: Grunsell, C.S.G., ed. *The Veterinary Annual*. 26th Issue. Wright and Sons, 1986; 372-374.
8. Brancker, Mary W: Primates. In: Cooper, John E., ed. *Manual of Exotic Pets*. British Small An. Vet. Assoc., 1985; 99-105.
9. Goltenboth, R: Nonhuman Primates. In: Klos, H.G. *Handbook of Zoo Medicine*. Van Nostrand Reinhold Co., 1982; 46-84.
10. Kollias, George V: Diagnosis and Management of Salmonellosis and Shigellosis in Nonhuman Primates. In: Kirk, Robert, W, ed. *Current Veterinary Therapy*. 8th ed. Saunders, 1983; 666-669.
11. Loeb, W: Clinical Pathology. In: Fowler, Murray E., ed. *Zoo and Wild Animal Medicine*. Saunders, 1986; 705-710.
12. Ott, Janis E: Virus Diseases of Primates — Their Hazards to Human Health. In: Kirk, Robert W., ed. *Current Veterinary Therapy*. 7th ed. Saunders, 1980; 733-741.
13. Fiennes, Richard: *Zoonoses of Primates: The Epidemiology and Ecology of Simian Diseases in Relation to Man*. Cornell University Press, 1967.
14. Fraser, Clarence M., ed. *The Merck Veterinary Manual*. 6th ed. Merck and Co., 1986; 946-951.

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